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BUREAU OF
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NEWS LETTER

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR NOVEMBER 1935

Vol. III, No. 1 (Not for publication) January 1, 1936

The News Letter is sent to you as confidential information and is sent only to employees of the Bureau. It has recently come to our notice that information from the News Letter has fallen into the hands of those for whom it was not intended. Will you please take care that it is not made available to anyone outside of the Bureau.

A. C. BAKER PLACED IN CHARGE OF FRUIT FLY INVESTIGATIONS

To provide better coordination and direction of important investigations on fruit flies, a special operating unit was established, effective December 10, with A. C. Baker in charge. The headquarters of this Division will be at Mexico City. Heretofore investigational work on fruit flies has been carried on in four laboratories, which have reported to two different units in the Bureau. It is believed that bringing the work together as one unit under one leader directly responsible to the Chief of Bureau will make it possible to accomplish the desired results more promptly. The change is made for organization reasons and to better coordinate these activities, without criticism of results obtained at individual laboratories or of administrative direction of the units responsible for them.

FRUIT INSECT INVESTIGATIONS

Lead and calcium arsenate apparently repel common red spider on apple trees.--E. J. Newcomer, Yakima, Wash., reports that a severe infestation of *Tetranychus telarius* L. occurred in the orchard block used for codling moth experiments. The block was divided into 32 small plats. Eight spray treatments were used in this block and each was replicated four times. Four of these treatments consisted of lead arsenate, with soap or calcium arsenate, and dry milk. In the other four, nonarsenicals, including cuprous cyanide with dry milk, phenothiazine, nicotine-bentonite, and nicotine extract with oil emulsion, were used. About the middle of August a detailed survey of the block showed that 2 percent of the trees receiving arsenical treatments were heavily infested with the red spider, as against 76 percent for the trees receiving the other treatment. Because of the striking difference in infestation and the fact that trees in both categories were distributed indiscriminately throughout the experimental block, this difference cannot be ascribed to chance. One tree had been left entirely unsprayed because it had no fruit and all of the surrounding trees were sprayed with an arsenical. The unsprayed tree was heavily infested, but the others had only a light infestation. Trees sprayed with nicotine-bentonite had the lightest infestation of those on which a nonarsenical was used, only 47 percent of these trees being heavily infested, as compared with 84 percent in the other three nonarsenical treatments. This material deposited the heaviest solid residue of any of the nonarsenicals. In this region it is a common occurrence, however, to have serious infestations of these red spiders in orchards that are heavily sprayed with lead arsenate throughout the season, and it appears that the repellent action of the arsenicals, which existed in the small experimental blocks, is not sufficient to drive the mites entirely out of larger areas.

Absorption by plants of arsenic from lead-arsenate treated soil.--W. E. Fleming, F. E. Baker, and L. Koblitsky, all of Moorestown, N. J., state that in determining the absorption of arsenic by nursery plants growing in plots treated with lead arsenate, the leaves from some deciduous shrubs grown in the experimental nursery sections were analyzed for arsenic. The leaf samples were taken and prepared for analysis in September. The analyses showed the following quantities of arsenic (As_2O_3), expressed as parts per million in the leaves of various plants from soil treated with lead arsenate at the rate of 1,000 pounds per acre: Buddleia variabilis, 0.40; Hydrangea arborescens, 1.20; Hydrangea paniculata, 0.55; Rosa gardenia, 4.60; Rosa Dr. Van Fleet, 1.55; Deutzia lemoinei, 0.50; Spiraea vanhouttei, 0.45; Exochorda grandiflora, 0.15; Berberis thunbergi atropurpurea, 0.05; Symphoricarpos vulgaris, 0.25; Forsythia suspensa, 0.15; Syringa vulgaris, 0.10; Weigela rosea, 0.30; Iris germanica, 1.05; Iris japonica (Stella), 0.30. The quantity of arsenic found in the leaves of plants treated with lead arsenate at the rate of 2,000 pounds per acre averaged more than four times as much as in material from soil treated at the rate of 1,000 pounds per acre.

Oviposition of Tiphia popilliavora Roh. (Koiwai or type strain) under storage conditions.--M. H. Brunson, Moorestown, reports that a total of 520 females of this imported parasite of the Japanese beetle were collected in the field on August 15 and 26 for the purpose of continuing a study on the oviposition efficiency of the females when held at different temperatures for different periods of time. The females were placed in separate containers in lots of 20, half of them being subjected to a temperature of 50° F. for 5, 10, 15, 20, 25, and 30 days, while the other half were exposed to a temperature of 75° for the same periods of time. At the proper intervals 20 females were removed from the cellars at the two temperatures mentioned and were placed in breeding cans for the parasitization of the host. Nearly all of the adult parasites from the first collection survived all storage periods, including the 30-day period, when stored at 75°. With the exception of those stored 5 days, those held at the higher temperature laid greater numbers of eggs, ranging from 66 per female for the lot put immediately into the breeding can to 16 per female for the lot held 30 days. Practically no eggs were laid by females held at 50° for 25 days or more. The records for the females collected August 26, 11 days later than the first, were quite similar, except that fewer eggs were laid throughout, and very few were laid by females stored 20 days or longer at either temperature.

Permanence of lead arsenate treatments in protecting grass from injury by Japanese beetle larvae.--Messrs. Fleming and Baker report that during the spring of 1929, 560 plots, each of 100 square feet, were established at Moorestown, N. J., to study the permanence of lead arsenate in protecting turf from injury. Concentrations of lead arsenate ranging from 5 to 60 pounds per 1,000 square feet, used alone or with certain fertilizers, were applied and mixed to a depth of 3 inches; then the plots were seeded with standard grass-seed mixtures. Each treatment was replicated seven times. The grub populations during 1929, 1930, and 1931 were too light to permit conclusions. In 1932 and in subsequent years, "attractors" were placed on the plots to draw beetles from adjacent areas and induce them to oviposit in the plots, insuring sufficient infestation to determine the relative value of the different treatments. In making the survey to determine the larval population in the different treatments, 35 square-foot diggings were made in each treatment. The average population in the untreated plots was determined and the percentage reduction in each treatment was calculated. Detailed data will not be given here, but the results indicate that the use of approximately 35 pounds of lead arsenate to 1,000 square feet, mixed thoroughly with the upper 3 inches of soil before seeding, will destroy practically all larvae in a lawn for at least 6-1/2 years after application. The addition of the following fertilizers appeared to decrease the insecticidal action, or its persistence, to a certain extent: Sheep manure, bone meal, hydrated lime, sodium nitrate, superphosphate, potassium chloride, and ammonium sulphate. It is apparent on the sassafras sandy loam soil where these plots are placed that practically complete elimination of the larvae can be assured for a period of 5 years, and the results indicate that recommended treatment may be effective as long as 10 years. The effect of fertilizers on the insecticidal action of lead arsenate is being studied in other experiments.

MEXICAN FRUIT FLY

Fruit fly larvae found early.--During the month of November three larval infestations were found in fruit in the lower Rio Grande Valley. The properties on which the infestations were found were located in the Mission, McAllen, and Edinburg districts. With one exception, this is the only season in which larvae have been found before the first of the year.

Trapping results.--There were only 11 adult Anastrepha ludens Loew taken in traps in November, as compared with 22 in October. Other fruit flies were trapped as follows: A. serpentina Wied., 23; A. fraterculus auct., 6; Anastrepha sp. "X", 1; Anastrepha sp. "Y", 1; A. pallens Coq., 488; Toxotrypana curvicauda Gerst., 1. In addition, 1 A. ludens, 1 A. pallens, and 1 T. curvicauda were trapped in the brush about 60 miles south of the border in Mexico.

Fruit shipments.--Approximately 1,081 cars of citrus fruits were moved by rail within the month.

DATE SCALE CONTROL

No scale found in November.--Inspection was completed in November in the Arabia and Coachella districts in the Coachella Valley, Calif. Inspection has now been completed in 7 of the 12 inspection districts and only 18 properties have yet to receive their final inspection in the remaining 5 districts. A total of 2,797 palms were inspected during November and no scale was found. In the Imperial Valley the Canary Island palms, except those previously infested, have been given their final inspection. Inspection of date palms was continued in the infested area. A total of 677 palm inspections were made during the month and no scale was found.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Lygus damage to alfalfa seed crop in Arizona.--L. L. Stitt, of the Tempe, Ariz., laboratory, has shown by cage records that alfalfa flower "slip" was caused by *Lygus* sp. and he noted a definite correlation between *Lygus* population and bloom "slip" in alfalfa fields in Arizona. His observations are reported as follows: "During the past season 20 alfalfa fields were surveyed three or more times to check *Lygus* population and development. Seed-head samples collected from the fields surveyed were examined at the laboratory for the percent of flower 'slip' and flower set. Fifty racemes taken at random from each sample were checked. Two fields in the Salt River Valley of Arizona gave a perfect correlation between 'slip' and *Lygus* population in that high population caused a higher 'slip', barring all other causes of bloom 'slip' that might occur in these fields. In the Buckeye and Yuma Valleys of the same State there was a definite correlation between population and 'slip.' For the Buckeye Valley the correlation was 0.643 and in the Yuma Valley it was 0.709. With the results of all three valleys--Salt River, Buckeye, and Yuma--showing a definite correlation between population and the amount of 'slip', it is evident that *Lygus* was one of the causative factors of flower 'slip' and of a reduction in the alfalfa seed yield. Cage records under controlled conditions have definitely shown that *Lygus*, both nymphs and adults, caused the flowers to 'slip' and the buds to 'blast.' Most of the *Lygus* found in the alfalfa were *Lygus hesperus* Knight."

Cooperative chinch bug agreement signed.--A cooperative project for the purpose of investigating the chinch bug-resistant properties of various varieties of grain sorghum under Oklahoma conditions has been entered into by the Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry of the Department, and the Oklahoma State Experiment Station. This work is being undertaken at Lawton, Okla.

Varietal and cultural control of the corn borer.--L. H. Patch and G. T. Bottger, Toledo, Ohio, report that the analysis of the data from the 1935 experiments has progressed far enough for a statement of the more obvious results. The results are summarized as follows: (1) A delay in tassel eclosion was effective in reducing the rate of borer survival on each of the three plantings made from May 11 to June 11. These results are in harmony with those obtained in 1934. (2) As compared with the most susceptible hybrid, A X TR, the most resistant hybrid, Hy X R4, contained 51.5, 55.1, and 66.4

percent less borers from a given number of eggs on the three plantings, respectively. The actual numbers of borers per plant were as follows: May 11 planting, 15.00 and 7.27; May 27 planting, 8.58 and 3.85; June 11 planting, 5.33 and 1.79. These large reductions in numbers of borers were due almost entirely to the delay in the tassel eclosion of Hy X R4. The time of silking of Hy X R4 was only 1.9 days later than A X TR but the delay in the unwrapping of the leaves from around the tassel was 4.5 days in the case of Hy X R4. This is seen from comparing the time interval between the appearance of the tassels and the appearance of the silks, the interval being 9.15 days for A X TR and 4.65 days for Hy X R4. (3) The tassel eclosion of Hy X R4 is delayed by the persistence of the two top leaves to remain tightly wrapped around the tassel much longer than is normal. The mean leaf area of the two top leaves of Hy X R4 was 57.5 percent greater than in the case of A X TR. It seems probable that this greater leaf area contributes to the persistence of the tight wrapping of the top leaves and hence to the borer resistance of Hy X R4. (4) In the experiment where 42 single, 3-way, and double crosses were planted on May 27, almost all of the variation in the rate of borer survival between the strains can be accounted for on the basis of the time of appearance of the tassels associated with the relative maturity of the strains, the delay in tassel eclosion, and the chance fluctuations in sampling. Only 4 strains showed lower rates of borer survival than might be expected. Three of these were the single cross Iowa L 317 X K.Y.S., the 3-way cross (Ohio 20 X Ohio 32) X R4, and the double cross (R4 x Hy) X (R4 x Iowa L 317). The fourth strain contained two inbreds, 540 and K. Y. S., neither of which showed indications of borer resistance as inbreds. The lower survival of this strain was probably due to chance fluctuations of sampling rather than to inherent resistance. (5) In the experiment where 136 inbred strains of corn were tested, the tasseling and silking dates, the heights, and the leaf area of the different strains were recorded. The presence of leaf wrapping around the tassel was also noted. Time of appearance of the tassels associated with the relative maturity of the inbreds, the delay in tassel eclosion, and the chance fluctuations in sampling, accounted for most of the variation between the strains with respect to rate of borer survival in this experiment, as well as in the preceding one. The relative leaf area of the inbreds per unit of height (bushiness) showed no relation to borer survival. A small group of inbreds, however, showed lower rates of borer survival than might be expected, and it is to these we should look for additional plant characters that would inhibit borer survival.

Rates of damage to sweet corn by European corn borer.--Morris Schlosberg and Ralph Mathes, of the Toledo, Ohio, laboratory, report as follows: "Tests to determine rates of damage to sweet corn by the European corn borer on the basis of use of the corn were continued in 1935, near Toledo, Ohio. Sixteen varieties of sweet corn were tested in four-fold replication in a modified Latin square arrangement at three different levels of borer population. The varieties were chosen to afford a seasonal range of maturing. Each test plot contained 6 rows of 15 plants each, 3 rows being used for canning and market-garden tests and the remaining 3 rows for seed tests. The plants were approximately 10 inches apart in the rows and the rows 36 inches apart. The three different levels of borer population were obtained from natural infestation and additional hand infestations with one and two egg masses per plant, respectively. The resultant borer populations per plant were determined by dissection of a random sample of 10 plants from each 6-row plot. Total yield results were determined from a random sample of 20 plants from each 3-row plot. Smutted plants and obviously diseased plants were avoided. The ears for market-garden and canning use were harvested approximately 22 days after mid-silking of the plants, and those for seed use at early dent stage. Final curing of the seed-corn samples was continued in wire screen bags hung in an open shed. Canning yields were determined by cutting the kernels from uninjured ears and from injured ears not too severely damaged for use. Market-garden yields were determined on the basis of injury-free ears as one class, and injury-free ears plus injured ears showing at least 4 inches of uninjured kernels around the cob as a second class. Seed-corn yields were determined by removing injured kernels from the ears and shelling the remaining kernels. To facilitate comparisons, the resultant yields of sound kernels were recalculated to 14-percent moisture on the basis of the moisture content of the corn determined at shelling. The resultant data were analyzed by appropriate statistical methods. In general, the data show that higher rates of damage accompanied later maturing. A general increase in yield is also noted with later maturing, although the tendency is less marked where numbers of ears are considered. From data at hand, but not presented in this report, it is evident that the later maturing varieties tended to produce greater total yields by weight, but lesser yields by numbers of ears, than earlier maturing varieties."

Remarkable resistance to hessian fly infestation indicated for strain of spring wheat.--In the course of harvest-time examinations of spring wheat varieties planted by R. M. Caldwell, at Lafayette, Ind., for rust resistance experimentation, one selection, namely, Illinois No. I, W 38, was observed to show remarkable resistance to hessian fly infestation. Samples of 50 stems each were taken of it and from rows adjoining it in all replications for critical examination. For purposes of ready comparison, the results of these examinations in terms of fly infestation, in all replications are summarized as follows:

Variety	Repli-cations	Percentage infested						Puparia per infested stem		
		Plants			Stems					
		Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
Ill. No. 1, W 38---	6	17	0	7	6	0	3	2	0	1.1
Adjacent varieties-	12	100	65	93	92	64	76	13	2.4	5.6

It may be noted from this that both the percentage of stems infested and the average number of puparia per infested stem are significantly lower in Ill. No. 1, W 38 than in the varieties adjacent to it. Steps are now being taken to use this selection in making crosses with good winter wheats to produce desirable fly-resistant hybrids. Infestation counts were made at harvest time on a total of 64 varieties and strains of wheat from Dr. Caldwell's leaf-rust nursery. In addition to Ill. No. 1, W 38, mentioned above, two other varieties indicated some resistance to fly.

Hessian fly in fall wheat.--Recent surveys by E. J. Udine show fairly uniform infestations of hessian fly in young wheat plants in the wheat-growing regions of western and central Pennsylvania. The general infestation runs between 20 and 30 percent.

JAPANESE BEETLE CONTROL

Funds for treating Japanese beetle infestations in Detroit, Mich., and in Ohio.--Shortly after the Japanese beetle quarantine hearing on November 16, C. E. Smith, Chief Forester of Detroit, Mich., advised the Bureau that the City Department of Parks and Boulevards will supply 5 tons of lead arsenate for application to all Japanese beetle infestations found this year in Detroit. Mr. Smith has also reported the approval of a W. P. A. conservation project in the city. This project includes funds for labor needed in applying the soil insecticide. A small area was treated with lead arsenate by means of one city-owned sprayer operating for a few days starting November 16. This work was soon discontinued because of lack of funds to pay laborers. Freezing weather shortly after that date made it necessary to postpone this work until spring thaws; however, funds are now available for completion of the soil treatment as soon as possible. Announcement has also been made by E. H. Hanefeld, director, Ohio Department of Agriculture and Conservation, of an emergency appropriation of $32,500 made available by the Ohio Board of Control for treatment of approximately 250 acres of ground in Ohio cities and towns where Japanese beetle infestations were found last summer. This amount will be available for control work during 1936, so that the treatments may be applied as soon as possible next spring. Two members of the Japanese beetle staff at White Plains have been assigned to survey the infested sections in order to determine more accurately the acreage requiring poisoning.

Japanese beetle quarantine endorsed.--Seventy-five nurserymen, nursery association representatives, and officials from 23 States and the District of Columbia, attended the public hearing held in Washington, D. C., on November 16 to consider the advisability of revoking the Japanese beetle quarantine or extending it to the States of Illinois, Indiana, Michigan, Missouri, Ohio, and North and South Carolina. Representatives were present from all the Middle Atlantic States, 3 New England States, each of the South Atlantic States except North Carolina, each of the eastern North Central States with the exception of Wisconsin, and from Kentucky, Nebraska, Iowa, Missouri, Washington, and Oregon. Testimony at the hearing was almost unanimously in favor of continuing the quarantine. Recommendations were also made that small isolated infestations should not be included in the quarantined area but that every effort should be made to suppress them. Opposition to the quarantine was expressed by two representatives of the Long Island Nurserymen's Association.

Japanese beetle grubs removed from Florida-bound truck.--At the 24-hour-a-day road-inspection station operated on U. S. Route 1 near Fredericksburg, Va., the transit inspector on duty at 11:30 p.m. on November 19 stopped a truck en route from Toms River, N. J., to Daytona, Fla., with 20 bags of soil and 20 cedar trees planted in a large box. The bags of soil were surrendered at the post and the soil was removed from the cedars. Examination of the soil disclosed 53 larvae. These grubs were determined at the White Plains headquarters as 25 specimens of *Popillia japonica* Newm., 17 *Ochrosidia villosa* Burm., 10 *Anomala orientalis* Waterh., and 1 miscellaneous lepidopteron.

Japanese beetle quarantine violator fined.--In its first prosecution for a violation of the Japanese beetle quarantine in the eastern district of Virginia, a conviction and $25 fine were obtained. The violation occurred on July 19, 1935, when Stanley Smith, of Manassas, Va., disregarded the road inspector and proceeded toward his destination with a quantity of sweet corn, string beans, and tomatoes obtained in Washington, D. C. The inspector gave chase in his car and overtook the truck about 2 miles from the post. The case was disposed of in the U. S. District Court held at Alexandria on December 2.

Dutch elm disease discovered at three new points.--Culturing of suspects collected by employees of the Bureau of Plant Industry from the Morristown, N. J., laboratory in test plots of approximately 30 trees each, located at the suggestion of the control division in sections of New Jersey outside this year's scouted area, resulted in the discovery of infection in Union Township, Hunterdon County; Independence Township, Warren County; and Wantage Township, Sussex County. The confirmations, totaling 12, were all obtained from dead trees in swampy areas near the northwestern boundary of the State. These isolated infections extend the New Jersey infected zone from 1,862 to 2,484 square miles and the 10-mile protective zone from 1,021 to 1,135 square miles. The 10-mile protective zone now extends 40 square miles into Pennsylvania. The work area now includes the remainder of Sussex and Hunterdon and all of Warren Counties.

More C. C. C. workers in New York assigned to Dutch elm disease eradication.--The Westchester County Park Commission has assigned part of three C. C. C. camps to Dutch elm disease work in the county for a portion of the winter. These men will work in the Blue Mountain Reservation, Mohansic Park, and Poundridge Reservation.

Eradication personnel.--Total personnel engaged in Dutch elm disease eradication at the end of November numbered 48 appointed men, 12 per diem workers on regular funds, 2,504 P. W. A. workers, 951 C. C. C. enrollees, 21 State-appointed men, and 7 State per diem employees, or a grand total of 3,543.

New England Christmas tree shipments halved.--At the peak of this year's movement of Christmas trees and evergreen decorative material from the New England States, indications are that the total shipments will approximate only 50 percent of those of 1934, according to inspectors now engaged in inspecting these products for gypsy moth infestation. Fewer desirable tree stands and losses to shippers who last year sold their trees on a consignment basis are cited as reasons for the shippers' refusal to again risk an overcutting in excess of their assured sales. Forty temporarily employed inspectors are stationed at the principal Christmas tree shipping centers. The inspection period extends from mid-November to about

December 15. Most of the trees are inspected at Ludlow, Groton, and St. Johnsbury, Vt., Lancaster, N. H., and a few towns near Bangor, Maine. Some of the trees inspected at St. Johnsbury have been shipped to Panama and the British West Indies. Weather conditions for tree cutting and hauling to railroad sidings were quite favorable until Thanksgiving. Since that date, snow and ice have hampered felling and hauling activities.

Steel rails infested with gypsy moth.--Inspection at Syracuse, N. Y., of steel rails removed from an abandoned railroad in New England and shipped to a steel mill resulted in the finding of 39 egg masses. The rails were torn up in the towns of Concord and Rochester, N. H., and at Hardwick, Vt., all points in the area heavily infested with the gypsy moth. Of 19 cars inspected, 10 were found infested. Fourteen of the egg clusters were new and 25 were old. This inspection was performed in cooperation with three inspectors assigned to the work by the New York Department of Agriculture and Markets. Steel rails are not included among the articles quarantined on account of the gypsy moth, and their shipment in this manner is unusual. Watchfulness on the part of the district inspector and local freight agents resulted in the tracing and inspection of the rails.

Bough-lot inspection.--During November, 3,124 evergreen bough lots in southern Vermont and 10 in western Massachusetts were inspected for gypsy moth infestation. With the exception of one lot at Worthington, Mass., all lots were found free from egg clusters. Two egg clusters were found near the Worthington lot, but these were not close enough to justify individual inspection of the boughs.

FOREST INSECT INVESTIGATIONS

Effects of abnormal October temperatures.--J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, reports that during the latter part of October 1935 abnormally low temperatures occurred throughout the Inland Empire, resulting in some peculiar effects on plant life. Although the temperatures were not excessively low, the minimum reaching zero and slightly below, they followed a long, open fall with but few nights of below-freezing temperatures. As the foliage of deciduous trees had hardly started to fade, the leaves were frozen to the limbs. Many apples had not been picked and the trees now carry a full complement of frozen fruit and brown leaves. The foliage of many ponderosa pine trees is beginning to fade. So far this injury appears to be confined to the 1935 growth of needles. There is no uniformity in its distribution, as the trees showing the injury occur in small groups and as scattered individuals; however, the damage may be more widespread than it now appears. These phenomena are, to a limited extent, similar to those resulting from the sudden drop in temperature in December 1924, which destroyed many ponderosa pine needles throughout northern Idaho and western Montana. Although at that time the injury to the foliage was very severe, only a few decadent trees died as a result of it. This injury to pine foliage results from the freezing of the protoplasm, which causes the needles to turn brown and fall. It is not yet known what effects this sudden drop in temperature had on overwintering bark-beetle broods, but it is doubted that it was sufficiently severe to cause much mortality.

Insects damage saw logs.--W. D. Bedard, Coeur d'Alene, reports that in May the Winton Lumber Company began cutting white pine saw logs on a small area in the Coeur d'Alene National Forest, and that these were left in the woods for several weeks after being cut. This practice, which was necessary for road construction, was a departure from the usual method. In June it was noted that many *Dendroctonus monticolae* Hopk., *Ips vancouveri* Sw., and *Hylurgops rugipennis* Mannh., were attacking these logs. As it is known that the blue stain always associated with bark beetle attacks seriously impairs the sale value of the log, periodic examinations were made to ascertain the extent and rate of injury. In addition to being attacked by bark beetles, all logs still in the woods after the middle of July were attacked by the long-horned woodborers, *Monochamus scutellatus* Say, *M. oregonensis* Lec., and *M. notatus* Drury. As all logs had been placed in the river by the end of August, a final examination was made of them on September 27. The stain had then developed to a heavy blue over the entire circumference and had penetrated almost all of the sapwood. In addition, 50 percent of the logs contained heavy broods of the long-horned woodborers.

Brood counts of native elm bark beetle.--C. H. Hoffman and C. L. Griswold, of the Morristown, N. J., laboratory, have counted the numbers of egg tunnels and larvae of the native elm bark beetle (*Hylurgopinus rufipes* (Eich.)) in two samples of bark taken from elm trees cut this fall in a swamp at Mt. Hope, N. J. Beavers had previously built a dam in the area and the subsequent flooding had gradually killed the trees, many of which were elm. As a result, a heavy population of *H. rufipes* had been built up. The samples of bark examined by Messrs. Hoffman and Griswold were from the most heavily infested material available. In 1 square foot there were 46 egg tunnels from which 1,211 larvae had developed. Another square foot of bark contained 52 egg tunnels and 1,217 larvae.

Hibernation of adults of native elm bark beetle.--It has been recorded in literature that adults of *H. rufipes* make hibernation burrows in the bark of elm. This habit has been noted in New Jersey this fall by R. R. Whitten, of the Morristown laboratory, and an instance of beetles entering bark in large numbers in an upland swamp in Danbury, Conn., has been brought to the attention of the laboratory by L. R. Fate, State leader in Dutch elm disease eradication. The beetles have been found to make such burrows in the bark of recently cut elm, as well as in the bark of perfectly healthy standing trees.

Longevity of elm leaf beetle.--During May 1935 a large number of adults of the elm leaf beetle (*Galerucella xanthomelaena* Schrank) were received at the Morristown laboratory for use in transmission experiments with the Dutch elm disease fungus. These beetles were collected as they were leaving hibernation quarters in Woburn, Mass. When the beetles were received at Morristown they were placed in large glass jars covered with cloth. The jars were kept in a screened insectary and the beetles provided with fresh elm foliage. Beetles needed for the experiments were taken from the jars from time to time and it was finally decided to ascertain how long the remainder would live. The last two adults of lots received between May 21 and May 28 died on or about November 11. Egg clusters were noted as late as August 27 and feeding as late as September 20, after which the number of remaining living beetles gradually decreased.

Life history note on Diprion polytomum Htg.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports on the life history of D. polytomum in southern Connecticut as follows: "It is apparent that there was a partial fourth generation this year. Larvae of second to sixth instars were found at Orange, Conn., on November 1, 8, and 19, and on the last date larvae of the first instar were also found. An adult female was taken in the field on November 1. Following a cold wave on November 24-25 (the lowest temperature at the plantation being 18° F.), an examination was made on November 26. Larvae were very scarce, only two living ones (of the fourth instar) being found. None of the very early instars were found. Apparently they had not been able to survive the freezing temperature. From time to time during November adult flies, all females, emerged from material collected from New Hampshire, Connecticut, and New York."

Oak twig dieback.--Mr. MacAloney also reports that the results of an investigation carried on jointly with J. R. Hansbrough, of the Division of Forest Pathology, show that the dying back of oak twigs, so prevalent in central Massachusetts on cut-over cordwood land, is due almost entirely to winter-killing of the buds or late spring frosts after the buds have opened. Of 500 twigs examined throughout the period, only 17 were killed by insects. Tree-hoppers and gall flies accounted for 13 of these, and tent caterpillars and gypsy moth larvae each killed two. No primary fungus was found on any twigs. Three hundred and sixty-two of the twigs were injured by freezing and 142 of these died back appreciably.

European pine shoot moth reduced at Brookline, Mass.--J. V. Schaffner, Jr., New Haven, reports that red pine in ornamental plantings in Brookline, Dedham, Newton, and Belmont, Mass., which had been heavily infested by the European pine shoot moth in the summer of 1933, showed a decided improvement this season. Trees that were badly misshapen have made a good growth and it is believed that by careful pruning they may be saved for ornamental purposes. The shoot moth infestation has practically disappeared, owing to the heavy winter mortality in 1933-34.

Notes on Itoplectis montana Cush.--P. B. Dowden, New Haven, reports on the parasite I. montana, reared from cocoons of the hemlock sawfly (Neodiprion tsugae Midd.) received from F. P. Keen, Portland, Oreg. These parasites were imported into the New England area with the hope that they might attack the recently discovered D. polytomum in that region. Mr. Dowden says: "This season's observations on I. montana were practically completed in November. Two hundred and eighty-eight more D. polytomum cocoons were attacked during November 12-14, and an adult female issued November 30 from cocoons attacked in the laboratory on October 18. A colony of 100 males and 100 females was liberated at Orange, Conn., and one of 174 males and 116 females at Macedonia Brook State Park, Conn. Adults issuing from N. tsugae cocoons used in reproduction work were placed in hibernation on November 16, but most of them have died. Forty males and 33 females that issued between November 8 and 16, however, are living well in hibernation."

Parasites of larch sawfly.--Mr. Dowden reports that dissection of larch sawfly cocoons received from the Flathead National Forest in Montana and from Deer River, Minn., sent by J. C. Evenden and L. W. Orr, respectively, shows that hymenopterous larvae as well as tachinid larvae from both regions appear to be identical, although positive determination will be impossible until adults are reared. The object of this study is to determine the sawfly parasites present. If all species do not occur in both regions it is planned to transport parasites from one region to the other until the same parasitic fauna is established in both. Additional collections of cocoons have been received from Mr. Orr from four other localities in the Lake States region.

Parasitization of elm leaf beetle.--P. A. Berry, New Haven, has made a study of the parasitization of elm leaf beetle pupae by Tetrastichus sp. at five localities in eastern Massachusetts. Collections for records of percentages of parasitization at the different localities were made at approximately weekly intervals from July 16 to August 14. A distinct increase in percentage of parasitization occurred during this period at all localities. At three of the points the percentage doubled, while at one point it increased from 7 to 83 percent. Pupae collected on the tree were invariably parasitized to a greater degree than those collected on the ground. In general, the degree of parasitization was lower than in 1934.

Forest-type survey.--W. L. Baker, New Haven, reports that a forest-type survey was conducted in the town of Savoy, Mass. Significant findings in this town were the total absence of oak in all of the 50 plots surveyed, as well as the fact that not an oak was seen in the town. Favored food predominated in only 4.6 percent of the forested plots surveyed. Not a single egg cluster was seen in the town.

Relation of leaf structure and spray deposit.--S. F. Potts, New Haven, reports that recent investigations of the effect of light and competition on leaf or needle structure at the top and bottom of open and closed stands, and the result of this effect on spray deposit and on insect feeding have been undertaken. The data on feeding, growth rate, and mortality is limited, but shows a very definite favorability of "sun" leaves over "shade" leaves for the several species of chewing insects observed. Deciduous leaves give about the same degree of variation between shade and sun leaves, while conifers differ considerably in the area exposed per given weight, as indicated by comparing white pine, red pine, spruce, and hemlock. The difference in area per given weight or leaf or needle at the bottom of trees, as compared at the top, varies with stand density and is one factor explaining the difference in insecticidal deposit per given weight of foliage at the different levels and densities of various types of growth.

GYPSY AND BROWN-TAIL MOTH CONTROL

Progress in gypsy moth control.--Up to November 15, under the W. P. A. projects, the numbers of workers employed in gypsy moth control in the different States were as follows: Maine, 82; New Hampshire, 79;

Vermont, 407; Massachusetts, 515; Rhode Island, 65; Connecticut, 537; New York, 173; New Jersey, 70; Pennsylvania, 738; total 2,666. During the second week in November an average of 1,976 men, from C. C. C. camps, were employed on gypsy moth work in the area east of the Barrier Zone. They were assigned as follows: New Hampshire, 119; Vermont, 540; Massachusetts, 740; and Connecticut, 577. During the last week in October over 162,000 new gypsy moth egg clusters, most of which were in Massachusetts, were creosoted by C. C. C. men. During the same week considerable time was lost in some of the States owing to the closing of forest areas because of the fire hazard. A decrease in the number of men doing gypsy moth work east of the Barrier Zone has been brought about by the abandonment of several C. C. C. camps, and by some of the camps having reduced their quotas from 250 to 200 men. Some of the men from 43 different camps are doing gypsy moth work, 12 of these being in Vermont, 3 in New Hampshire, 18 in Massachusetts, and 10 in Connecticut. Of these camps, 12 have quotas of 100 or more men promised for gypsy moth work, the others from 20 to 60 men per camp. By the end of November slightly more than 2,800 W. P. A. workers (the total provided for in the set-up) were engaged in gypsy moth scouting, thinning, and treatment work. These workers were obtained through the National Reemployment Service, more than 95 percent of them being drawn from relief rolls. Because of employment conditions it was not possible to assemble these men in areas where gypsy moths were abundant for approximately 2 weeks' training, as has been done in the past; therefore, in areas where little or no infestation was known to exist, it was necessary to train these men for scouting with artificial egg clusters. Where infestations have been found outside the Barrier Zone since work was started, W. P. A. workers scouting in neighboring towns have been transported to the infested area in order that they might have an opportunity to see egg clusters deposited under natural conditions. This has resulted in the workers showing more interest in their work. Supervisors in charge of thinning operations are directing their crews so that growth most favorable to gypsy moth development is given first consideration for removal, rendering the remaining stand more resistant to the development of this insect. In the Pennsylvania area much thinning and cleaning is being done in localities where tree tops previously cut for mine props cover the ground and make thorough scouting expensive and extremely difficult. The cleaning of these areas will be of permanent benefit. To date 8 new and 1 old egg clusters have been found in Derby, Vt., a town located east of the Barrier Zone and bordering Canada. This town is not, at present, under quarantine on account of the gypsy moth. All egg clusters located have been destroyed by creosoting, and thinning work will be done in the area as soon as possible. As a considerable number of Christmas trees are normally cut in Derby each year, the precaution was taken by this project to determine where trees would be cut this season and to arrange to have these areas carefully examined before trees were cut and removed. Fortunately, most of the operators who normally cut trees in Derby were obtaining their trees this season across the border in Canada. In fact, only one operator planned to cut trees in Derby this year and his work was confined to two areas, both of which had been examined by W. P. A. workers of this project with negative results. During the summer of 1934 three adult male moths were caught at an assembling cage in Foster Township, Luzerne County, Pa., but no infestation was located there as intensive scouting had been carried on during the fiscal year. However, it was noticed that a stone wall had been recently removed and it was learned that the stones from this wall were used in road-construction work nearby. Two moths were taken from tanglefoot at an assembling cage placed in the same locality during the summer of 1935 and an infestation has recently been discovered in that vicinity. From the information at hand, it appears that an infestation existed in this locality during the fiscal year 1935, but all egg masses were deposited on the stones used for road-construction work. Apparently some of the egg masses were broken in handling the stones, which explains why male moths were captured at the cage this summer and egg clusters were recently found. Tree growth between the wall apparently infested in 1935 and the place where the stones were used for road-construction work has been carefully examined and no infestation found. During the last 2 weeks of November a total of 250 new pick-up trucks were delivered at the storehouse at Greenfield, Mass. In order to meet the safety requirements, considerable work was necessary to put them in condition for the field. These trucks are being sent into the field as quickly as they can be conditioned. In Pennsylvania during the latter part of the month 21 pick-up trucks and 16 1-1/2-ton trucks were delivered at the storehouse at Wilkes-Barre. All of these were placed in immediate use. Recently a shipment of rails from an abandoned railroad was made from a point near Rochester, N. H., to a steel plant in Syracuse, N. Y. These rails were shipped in box-cars and placed on the company's siding near the plant. On inspection by the men of the New York Conservation Department, gypsy moth egg clusters were found on some of them. A number of cars were inspected before these were discovered.

Brown-tail moth food plants destroyed.--On November 15, under the W. P. A. emergency project, the numbers of men employed on brown-tail moth work were as follows: Maine, 93; New Hampshire, 359; Massachusetts, 375; total, 827. Under the W. P. A. brown-tail moth project most of the work has consisted in the removal of favored food plants, principally old apple trees, wild cherry, small useless white oaks, and a few other species. These cutting operations have been performed in localities where infestations have been persistent. At a considerable number of localities the trees cut bore brown-tail webs and these were removed and destroyed. Up to the second week in November over 75,000 trees were cut in Maine, New Hampshire, and Massachusetts and, in addition to this, 461 acres grown up to wild cherry were cut over. Any parts of the trees that would be useful as firewood were cut and the brush and slash piled and later burned. During the chopping work 13,155 brown-tail webs were removed and destroyed in Maine, 7,693 in New Hampshire, and 8,963 in Massachusetts.

PLANT DISEASE CONTROL

Notes on barberry eradication.--On December 15, 2,260 men were employed on barberry eradication in 15 States. Field work had been discontinued in Montana and North Dakota until spring. Reports from the field indicate that approximately 1,000 men will be given continuous employment during the winter months. Their work will be restricted largely to a survey of some of the larger cities in Ohio, Minnesota, Illinois, Iowa, and

Nebraska. In Minnesota work in the hill areas of the southeastern part of the State will be continued. There will also be considerable rural work done in Colorado, Indiana, Iowa, Missouri, Pennsylvania, and Wisconsin. The extent of winter work in Virginia and West Virginia will depend on weather conditions. Francis B. Powers, in charge of barberry-eradication work in Michigan, reports that two widely separated groups of counties have been included in the areas to receive attention of survey crews. One group is composed of the several counties bordering the shore line of Lake Michigan and the inland counties of Wexford, Missaukee, Lake, Osceola, and Newaygo; the second group, on the eastern side of the State, includes Huron, Sanilac, St. Clair, and Macomb Counties, and the inland counties of Genesee, Oakland, and Lapeer. Conditions under which work has been conducted vary widely. Some of these counties are in the resort areas, others in the sparsely populated parts of the State where the original plantings of bushes were not numerous but where some spreads have taken place. Since January 1, 1935, approximately 70,000 bushes have been eradicated on 800 different properties, and 287 different persons have been given employment since July 1. Ten of these constituted a part of the supervisory personnel and were paid by the State of Michigan; 14 are under appointment with the United States Department of Agriculture; and the remainder have been taken from relief rolls. Since 1931 work with school groups in 33 counties in Indiana has resulted in 126 boys and girls reporting approximately 150 different properties on which barberry bushes were growing. These reports have led indirectly to the eradication of many more bushes. W. E. Leer has submitted the following brief report covering recent activities in connection with this project in his State. "During November 1935 study materials were sent to all of the high-school principals and science teachers and to the grade teachers having pupils in the fifth, sixth, seventh, and eighth grades in these 33 counties. From the close of the school term last spring until about November 10, 1935, only 1 barberry location was reported by a child. However, during the period November 11 to 30, 1935, 9 boys and girls reported barberry locations (figures not included in totals given above). These results merely confirm the prevailing idea that the intensive school work must be followed up if maximum results are to be realized. Survey activities in Indiana were increased beginning in August 1935, as the result of the grant of W. P. A. funds. Crews of 11 relief laborers and 1 crew foreman were organized in Lake, Porter, La Porte, Elkhart, Lagrange, Allen, Wabash, Fayette, Wayne, and Franklin Counties. Intensive survey work is being done in these counties. It is planned to work during the entire winter, unless the weather becomes unusually severe. City survey work will be carried on when weather conditions are not satisfactory for rural survey. Approximately 1,618 square miles were surveyed from August 1 to November 30." During August and September L. M. Ames inspected 27 nurseries for rust-susceptible barberries. These inspections were made as a result of requests for permits to ship species of barberries into or between protected States. During the past 6 months Mr. Ames has made approximately 150 separate identifications of specimens of barberry, either intercepted in the mail by quarantine officials or sent in for identification by nurserymen. He reports much closer cooperation on the part of State nursery-inspection organizations, as they are becoming better acquainted with the purpose of the work and the provisions of the quarantine. In many States inspectors are making a record of all barberries, other than the Japanese variety, found during their inspections of other shrubbery. This procedure will aid materially in bringing about a clean-up of the smaller nurseries, especially those that sell only to local customers.

New record in blister rust control.--Accomplishments in Ribes eradication in the Northeastern States during the field season of 1935 established a new record for such yearly activities in this region. An area of about 1,100,000 acres was cleared of over 27,000,000 currant and gooseberry bushes. This acreage represents an area about one-fifth the size of Massachusetts. The work was performed under five programs: Regular cooperative work, E. C. W., E. R. A., P. W. A., and W. P. A. Nearly 400,000 man-days of employment were given to needy workers on this phase of the control project.

Heavy blister rust infection found in unprotected pine plantation in Maine.--Observations were made recently of blister rust conditions in a white pine plantation at Moxie Gore, Maine. The trees were planted in 1916, and now average about 20 feet in height. No protection measures have been applied. In the acre plot examined, 89 percent of the 887 pines were infected and 39 percent of the total trees had already been killed.

COTTON INSECT INVESTIGATIONS

Effect of excessive amounts of calcium arsenate on following crops.--R. C. Gaines and M. T. Young report concerning a test that has been conducted for 5 years on the same plots at Tallulah, La., where large quantities of calcium arsenate have been broadcast on the soil and harrowed in just prior to the planting of cotton. Calcium arsenate was applied at the rate of 400 pounds per acre each year, or a total of 2,000 pounds to one plot, while the adjoining plot has been left as an untreated check. Cotton has been planted on these plots each year. During the first 2 years the untreated plot produced more seed cotton per acre than the treated plot, but during the last 3 years the treated plot has led in yield. The average yield of 1,778 pounds per acre for the treated plot, as compared with 1,795 pounds for the untreated plot, shows a difference of 17 pounds, or 1 percent, in favor of the plot without calcium arsenate. These results indicate that in the fertile Mississippi River Delta soil of Madison Parish, La., there appears to be no danger of reducing the yield of cotton, even by the excessive use of calcium arsenate. Under ordinary farm conditions, probably more than 100 years would elapse before 2,000 pounds per acre would be applied to cotton for boll weevil control. In 1934 and in 1935 soybeans and cowpeas were planted on a small part of both treated and untreated plots. Both crops grew normally on the untreated plot, but on the treated plot the young plants died, none of them reaching maturity.

Disease of cotton leaf worm pupae.--C. F. Rainwater reports that Alabama argillacea Hbn. appeared at Florence, S. C., early in August this year but never became really abundant and only an occasional field was stripped in August and September. In October the number of larvae in the fields was apparently still less and cotton made a second growth. Several hundred pupae were collected to determine what factors were holding them in check. A few were parasitized by Brachymeria ovata (Say) but not enough to account for the reduction in population. Most of the pupae became hard and brittle externally and the interior was whitish and granular. Only a small percentage produced moths. In the diseased pupae the parasites, when present, were also killed.

Cotton flea hoppers on flight screens.--K. P. Ewing and R. L. McGarr report that less than half as many cotton flea hoppers were taken on the tanglefoot flight screens at Port Lavaca, Tex., this year as in 1933 and 1934.

Cotton flea hopper control tests.--Reports from Messrs. Ewing and McGarr, of Port Lavaca, show that the increase in yields from field tests for cotton flea hopper control were not as large as those obtained in former years. A total of 42 1-acre plots and 341 acres were used in large-scale field tests. Of these plots, 11 showed a profit and 13 a loss from dusting. The average net profit from the 24 sulphur-dusted plots was $1.40 per acre, the lowest ever obtained in this region. The 6 plots dusted with the so-called "wet mixture" of 75 percent calcium arsenate and 25 percent paris green produced gains of 122 to 410 pounds, averaging 217 pounds of seed cotton and $3.95 profit per acre. In the three plots in which the wet mixture was directly comparable to the "dry mixture" of 75 percent calcium arsenate and 25 percent paris green, the average gains were 237 pounds for the wet mixture and 221 pounds for the dry.

Pink bollworm parasite work.--The work of the present year on parasites of the pink bollworm was reported by A. J. Chapman and L. W. Noble of the Presidio, Tex., laboratory, as follows: Microbracon kirkpatricki Wilk.: 40,000 were shipped to Puerto Rico from which 36,000 adults emerged; 15,000 liberated at Torreon, Mexico, and 15,000 at Las Delicias, Mexico, in cooperation with the Mexican Department of Agriculture; 5,200 sent to Tallulah, La., for experimental purposes; 52,000 liberated in fields near Presidio. Recoveries have been made from field-collected bolls in Puerto Rico and at Presidio. Chelonus blackburni Cameron: 4,615 liberated at Presidio, where recoveries have been made from field-collected bolls. Exeristes roborator Fab.: 2,000 shipped to Puerto Rico; 4,000 liberated at Las Delicias, Mexico, in cooperation with the Mexican Department of Agriculture; 4,500 placed in cold storage at Presidio. Elasmus platyedrae Ferr.: Breeding stock was maintained but no liberations were made. Microbracon mellitor Say, (Hawaiian pink bollworm strain): Experimental work on breeding methods conducted but no liberations have been made.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Most of the gin-trash inspection during the month was carried on in the Western Extension of Texas, in the regulated area, and adjacent territory. On the whole, conditions were satisfactory and a considerable amount of trash was inspected without finding any reinfestation. Regulatory inspectors continued to examine all of the trash in the regulated areas of Florida and Georgia during the first half of the month, after which ginning was so irregular that it was impracticable to continue the inspections. The results in these areas have also been negative. Toward the close of the month two machines were sent to the Salt River Valley of Arizona for additional inspection. As a result of inspections carried on by regulatory inspectors, pink bollworms have been found this season in the El Paso and Pecos Valleys of Texas, the Mesilla Valley of New Mexico, and the Safford area in Arizona. In Pima County, Ariz., inspections have been made but no pink bollworms found. During the latter part of the month, however, 7 specimens of the Thurberia weevil were taken, all of which apparently came from cotton produced south of Tucson. All of the weevils were taken from Pima or long-staple cotton. Thus far no weevils have been found in the main cotton area at Marana, northwest of Tucson.

Field clean-up in Big Bend of Texas.--The cleaning of cotton fields in the Big Bend area of Texas got under way early in November. The clean-up has not gone forward as rapidly as was hoped, as a top crop of bolls is being produced and farmers have been somewhat slow to complete picking; also because the crop is from 2 to 3 weeks later this year. At the close of the month a little less than 200 acres had been cleaned; however, this small acreage was in fields containing the largest number of worms. The remaining acreage will probably be completed during the first part of the coming month.

Road-station inspection.--Four of the interceptions made at the Marfa, Tex., road station in November were found to be infested with the pink bollworm. Of this number, three contained one living larva each, and one also contained a dead worm. On November 14, 1-5/8 pounds of seed cotton were taken from a truck. This small quantity of seed cotton contained 307 living and 11 dead larvae and 8 pupae. This is perhaps the largest number of worms ever intercepted at one of our road stations.

Eradication of Thurberia plants in Arizona.--The eradication of Thurberia plants in southern Arizona, with W. P. A. funds has made excellent progress during the month, where it is still being carried on in the Tortillita Mountains north of Tucson. During the month approximately 24,000 acres were covered, from which some 2,500 plants were removed. Part of this acreage contained a large number of plants in former years but during the past few years it has been heavily pastured with goats, so that very few plants are being found at this time.

Wild cotton eradication in Florida.--The eradication of wild cotton in southern Florida was resumed during the last half of November. This work is also being carried on this season with W. P. A. funds. There has been some difficulty in obtaining the desired number of laborers, owing to the fact that many of them were being utilized to repair the damage caused by the tropical storm which passed over southern Florida early in September. It is hoped to have the full quota of men at work within the near future. Some 125 acres had been covered by the end of the month, from which 2,087 mature, 27,166 seedling, and 14 sprout plants were removed. All but 37 of the mature plants were on acreage not previously cleaned.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Pyrethrum-oil sprays control beet leafhopper, tests indicate.--Preliminary reports submitted by V. E. Romney, Phoenix, Ariz., and G. T. York, Modesto, Calif., who are engaged in investigations of Eutettix tenellus Bak. in the Arizona-New Mexico area, indicate promising results in controlling this pest on seed beets by applying an atomized pyrethrum-oil combination spray to the plants. In field tests conducted in the Salt River Valley of Arizona and in the Mesilla Valley of New Mexico, it was determined that from 85 to 97 percent of the leafhopper adults and nymphs were killed by this treatment. These results were obtained on three sample plots each in New Mexico and Arizona.

Adding sulphur to Mexican bean beetle insecticides controls powdery mildew on beans.--The results of recent field tests performed by L. W. Brannon, of the Norfolk, Va., laboratory, indicate that when powdery mildew occurs on snap beans in association with Mexican bean beetle infestation, control of both the insect and the disease may be obtained by the addition of wettable sulphur to the sprays recommended for the bean beetle, or by the use of sulphur as a diluent for dusts used against this insect. Best results were obtained by adding 2 pounds of wettable sulphur to derris root or cube root powder suspensions containing approximately 0.02 percent rotenone and by the use of derris or cube dust mixtures containing approximately 0.5 percent rotenone, with sulphur as a diluent. Satisfactory results were also obtained with a dust mixture containing 60 parts of synthetic cryolite and 40 parts of sulphur by weight.

Reduction of soil moisture decreases wireworm populations.--K. E. Gibson, of the Walla Walla, Wash., laboratory, reports that recent examinations in experimental fields in which normal irrigation was withheld have revealed that this drying-out process in alfalfa fields resulted in reductions in wireworm populations ranging from 55.5 to 74.2 percent, with an average of 65.5 percent, as compared to similar fields in which normal irrigation practices were followed. In one wheat field similarly treated a reduction of 81.8 percent occurred in wireworm population. The principal wireworm species involved were the sugar beet wireworm (Limonius californicus Mann.) and the Pacific coast wireworm (L. canus Lec.). These experimental fields will be planted to potatoes in 1936 and observations will be made on that crop in order to evaluate the effectiveness of this proposed method of wireworm control.

Pea weevil infestation in Palouse district of Washington and Idaho shows decrease in 1935, as compared to 1934.--T. A. Brindley, of the Moscow, Idaho, laboratory, reports that, according to the examination of samples of peas from a total of 1,578 fields grown in 72 localities in Washington and Idaho in 1935, an average of 3.34 percent of the peas were infested by the pea weevil, these figures being based on information supplied by the pea-grading service of the Bureau of Agricultural Economics. A total of approximately 125,704,461 pounds of peas were involved in the aggregate yield from which these samples were taken. The average infestation for the different localities ranged from a maximum of 63.7 percent to zero. The average pea weevil infestation for 1935 (3.34 percent), based on the samples examined, shows a slight reduction over that of 1934, which was determined to be 3.95 percent. The data from which these averages were derived were obtained by taking a small uniform sample of peas from every fifth bag of peas as they were delivered to the warehouse. From this composite sample 250 grams were taken at random and examined to determine the percentage of weevil infestation.

Presoaking period important factor in vapor-heat treatment of narcissus bulbs for nematode control.--Randall Latta, of the Sumner, Wash., laboratory, reports that, as a result of recent experiments with narcissus bulbs infested by the bulb nematode (Anguillulina dipsaci (Kuhn.) Jerv. & v. Ben.), it was shown that none of the nematodes survived a vapor-heat treatment for 8 hours at 110°-111° F., with a 2-hour presoaking period at from 70° to 80°, preceding the treatment. Treatments for the same duration, but without presoaking, were slightly less effective in that very few (three or less) individuals survived in five of the nine tests. Treatments for 6-hour durations following a presoaking period were only slightly less effective than the 8-hour treatment without presoaking, but the 6-hour period without presoaking had comparatively high survivals, as compared to the other tests.

Differences in response of tobacco types to hydrocyanic acid gas fumigations.--As a result of experiments conducted at the Richmond, Va., laboratory, E. W. Livingstone reports significant differences in the relative penetration and in the percentage of cigarette beetle larvae killed when fumigating Burley and bright flue-cured tobacco with hydrocyanic acid gas in small fumigating chambers at atmospheric pressures. In Burley tobacco all of the insects were killed at a depth of 4½ inches from the surface of the stored tobacco, whereas in the bright flue-cured tobacco a very low percentage of insect mortality was obtained at that depth. The same relation existed between the percentage of larvae killed at depths ranging from 2¼ to 10¼ inches. It is believed that this difference in penetration is not purely mechanical, but may be attributed to the individual characteristics of the two types of tobacco. It is possible that some of the differences in penetration may be due to differences in the absorptive and adsorptive properties of the tobacco. Burley tobacco is relatively hard and has a low moisture content, and is not as susceptible to insect attack as are the flue-cured types. Bright flue-cured tobacco is usually relatively soft and pliable, and is easily susceptible to changes in atmospheric humidity. In comparison with Burley tobacco, its water content is high and its nicotine content low. In this connection it should be observed that moisture is highly attractive to hydrocyanic acid gas.

INSECTS AFFECTING MAN AND ANIMALS

Mosquito breeding in storm-sewer catch basins.--W. V. King reports that during the 21 weeks between June 19 and November 14, with a total of about 200 weekly observations, catch basins in Orlando, Fla., contained larvae of Culex quinquefasciatus Say 117 times, of C. nigripalpus 57 times, and of Aedes aegypti L. 71 times. The negative collections for Culex were due to flushing, oiling, drying, or filling of some of the basins at different times. A. aegypti larvae were not found in any of the basins until September 27, but after this date several of them contained larvae of this species on each occasion. The estimated average number of larvae for the positive collections was about 20 per dip for Culex and about 3.3 per dip for A. aegypti.

Hatching of Aedes vexans Meig.--H. H. Stage, Portland, Oreg., reports that the collecting and flooding of a number of soil samples have been continued for ecological studies. Samples taken in nature in September produced a hatch of 83 percent A. vexans; those taken in October, 7 percent; and those in November, none. Samples taken in August from Sauvies Island before the fall rains, left under a shelter where they remained dry but at the same time were exposed to outside temperatures, gave hatches as follows: September, 76 percent; October, 7 percent; and November, none. These data indicate that low temperatures are responsible for nonhatching of eggs during the cold months, and that moisture has little or no effect.

Effect of infestation by Cochliomyia macellaria Fab. following infestation by C. americana Cushing and Patton.--At Valdosta, Ga., tests have been conducted on experimental animals to determine whether or not infestation of animal wounds by C. macellaria following infestation by C. americana conduces to the healing of the wounds. Four goats were used, each of which received two identical wounds, one on the right hip and one on the left. All wounds were artificially infested with C. americana larvae. After these had matured and dropped, one of the wounds on each animal was artificially infested with C. macellaria larvae. The other wound on each animal was left untreated. At the conclusion of the tests no significant difference was noted between the infested and the noninfested wounds.

Attack by screw worm and related flies on wounded animals.--A series of tests was conducted at Valdosta during October and November with artificially wounded animals for the purpose of obtaining data on infestations of the secondary screw worm (C. macellaria) and other blowflies when the primary screw worm (C. americana) is kept under control. When eggs were deposited by C. americana these were carefully removed, but all others were left undisturbed. Eleven goats, 11 sheep, and 5 calves were used. During the period when wounds were attractive, C. americana deposited 307 egg masses on the wounds. C. macellaria initiated infestations in 4 wounds out of 63. One sheep died as a result of infestation by this species. In this case the fleece about one of the wounds was unclipped. Sarcophagid larvae initiated infestations in 7 out of 63 wounds. None of these were fatal. None of the 63 wounds received initial infestations from larvae of Phormia but these larvae were present as a result of reinfestation in three cases. Lucilia larvae initiated infestation in only one case.

Seasonal activity of C. americana and daily activity in relation to air temperatures.--From observations made on the experimental farm at Valdosta on five series of wounded sheep, goats, and cattle the following conclusions have been drawn: (1) There has been no apparent decrease in activity of this fly during the first 3 weeks of November. (2) It appears to be as active on days when the maximum air temperature is 75° F. as on days when it is 80° to 85°. (3) Maximum air temperatures 70° or below greatly decrease activity of adults. (4) Eggs were deposited on the wounds of animals when air temperatures were as low as 63.5°. (5) No eggs have been deposited on the wounds of animals when the maximum air temperatures were 60° or below. (6) Air temperature as low as 24° did not kill the adults in nature. (7) The numbers of egg masses are noticeably increased on warm days following days too cold for oviposition.

Effect of varying numbers of C. americana and C. macellaria larvae in wounds of sheep.--In a series of tests to determine the number of larvae per pound of body weight of sheep necessary to kill the animal, the following results have been obtained: Sheep died as a result of C. americana larvae in doses as low as 12.96 larvae per pound. For C. macellaria the minimum fatal dose was 33.95 larvae per pound.

Hosts of the Gulf coast tick.--One hundred and eleven specimens of birds and small mammals have been collected from several localities in Georgia and examined for the Gulf coast tick. Larvae have been taken from sheep, common gray squirrel, fox squirrel, cottontail rabbit, blue jay, mocking bird, towhee, house wren, meadow lark, bobwhite, and migrant shrike. The nymph has been collected from the meadow lark, house wren, and sheep. The meadow lark is the principal host of both forms. As many as 289 have been collected from one bird.

Biological notes on Gulf coast tick.--Experiments on the effect of low temperatures on unengorged nymphs of A. maculatum Koch were completed in November by Carroll Smith, of the Washington office. In general, no ill effects were noticed at temperatures as low as 5° F., while many ticks survived at -5°. At -7° and below none survived. Molting records were completed on 514 engorged larvae. The period from dropping to molting ranged from 15 to 28 days. Unengorged larvae accepted as hosts English sparrows, juncos, and quail.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--On October 2, 1935, five living mature larvae of the Mediterranean fruit fly (Ceratitis capitata Wied.) were taken at New York out of a peach discarded by a passenger from the Mediterranean region and abandoned in a wastepaper basket in a stateroom on board ship. A living adult of Sitona japonica Roelofs arrived at San Francisco on September 25, 1935, in packing for baggage from Japan. This weevil is a pest of the roots of Astragalus sinicus in Japan. One living and one dead larva of the bean pod borer (Maruca testulalis Geyer) were found at San Juan, P. R., on September 20, 1935, in two string beans in stores from Venezuela. This represents the first record in our files of this pyralid being intercepted from Venezuela. Two living adults of the weevil Cossonus spathula Boh. were taken at New Orleans on August 18, 1935, under the bark of a hardwood log in cargo from Mexico. A living specimen of the coreid Capaneus vates Stal arrived at Charleston, S. C., on September 20, 1935, with banana debris in cargo from Guatemala. Three living larvae of the European corn borer (Pyrausta nubilalis Hbn.) were intercepted at Seattle, Wash., on September 18, 1935, in green corn in ship's stores from Japan. The larvae were boring in the cobs at the base of the ears. A living specimen of the cicadellid Nephotettix apicalis Motsch. was taken at Honolulu, Hawaii, on September 11, 1935, on Lilium sp. in ship's quarters from the Orient. Adults of dead Bruchus rufipes Hbst. were found at Washington, D. C., on March 21, 1935, in seed of Vicia sp. in the mail from the Union of Soviet Socialist Republics. A living specimen of the chief earwig (Prolabia arachidis Yersin) arrived at Eagle Pass, Tex., on August 21, 1935, on a sour lime in cargo from Mexico. This earwig occurs outdoors in southern United States. Six living larvae of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) were intercepted at Philadelphia on October 25, 1935, in galls on white turnips in stores from Denmark. One dead and six living larvae of the pink bollworm (Pectinophora gossypiella Saund.) were found at Norfolk, Va., on September 2, 1935, in three cotton bolls in quarters from Montserrat, British West Indies. This is our first record of this insect being intercepted from Montserrat. A living larva of the scarabaeid Anomala aenea De G. arrived at Boston on October 2, 1935, in soil around the roots of plants (Heuchera sp.) in the mail from Sweden. A. G. Boving states that this species is injurious to nurseries.

Pathological interceptions of interest.--The first interception of Cercospora cruciferarum Ell. & Ev. was made at New York on November 11, the host being radish leaves from Colombia. The first interception of Coleosporium ipomoeae (Schw.) Burr. was made at Brownsville, Tex., on October 31 on a morning-glory leaf from Mexico. Diplodia tubericola (Ell. & Ev.) Taub. was intercepted at Mobile on November 6 in malanga root from Spanish Honduras. The only previous interception of the disease on this host was from the Dominican Republic. A dead Vespina wasp picked up at New Orleans on October 23 in banana trash from Mexico was infected with a fungus determined as Hirsutella sp., probably H. saussurei (Cke.) Speare, our first interception of the genus. Puccinia chrysanthemi Roze was intercepted from England for the first time on October 15 at New York. Sclerotinia cinerea (Bon.) Schroet. was intercepted on pear for the first time on October 17 in fruit from Italy at New York. Septoria aucubae West was intercepted on Aucuba japonica leaves from Italy on October 17 at New York, the only previous interception being on a plant of unknown origin.

Tuckahoe potato may occur in China.--A growth about the size of a baseball was intercepted at Seattle on October 15 in baggage from China. This growth proved to be a Sclerotium sp. closely resembling the sclerotial stage of Poria cocos (Schw.) Wolf, often called Tuckahoe potato and reputed to have been used for food by the Indians of the eastern part of this country. Like the American form, the Chinese specimen appears to have developed on the root of a pine tree. So far as the specialists consulted are aware, no such fungus had ever been reported from China.

Five new nemas named.--Five of the new species of nema intercepted last year have been named by G. Steiner, of the Division of Nematology of the Bureau of Plant Industry, as follows: Acrobeles glaphyrus Steiner in tuberose from Mexico (see p. 24 of the January 1935 News Letter); Anguillulina gallica Steiner in elm from France (see p. 21 of February 1935 News

Letter); Aphelenchoides hunti Steiner in tiger lily from Japan (see p. 24 of the January 1935 News Letter) and in husk tomato from Mexico (see p. 20 of the July 1935 News Letter); A. solani Steiner and Cephalobus cubaensis Steiner in potato from Cuba (see p. 21 of the June 1935 News Letter).

Wholesale collecting on Guatemalan material.--A shipment of special permit plants from Guatemala was inspected at San Francisco on November 12-14. All of the plants were more or less infested, and numerous insects and other zoological material including snails, earwigs, slugs, and worms were found in soil about the roots. Ferns yielded a list of 21 different items; Ficus sp., Chrysomphalus aonidum (Linn.) only; orchids, a list of 46 items; palms, 6 items; and packing, 7 items. Some of these items belong to groups of economic importance, including Curculionidae, Lygaeidae, and Pyralidae.

China Clipper inspected.--With the return to San Francisco of the Pan American airplane China Clipper recently from its pioneering flight from Guam via Wake, Midway, and the Hawaiian Islands, inaugurating fast transportation between South Sea islands and our West Coast, a very potent channel for the introduction of serious plant pests from those regions and the Orient. This is evidenced by the fact that upon arrival at the Alameda, Calif., Airport October 24, an inspection of the plane revealed the presence in quarters of cuttings of Caladium and Strelitzia plants, the former being infested with the Pinnaspis minor (Mask.) scale and the latter with two other scale insects, Saissetia hemispherica (Targ.) and Chrysomphalus aonidum (L.).

DOMESTIC PLANT QUARANTINES

Progress in citrus eradication.--The entire citrus-growing area in the Galveston-Houston country, extending from Galveston, Tex., to the Louisiana line at Orange, covering six counties, will have been inspected intensively for citrus canker by the close of December. Relief crews are following closely and destroying worthless escaped and abandoned citrus trees, and nearly one million such trees in this area have been destroyed since early in August. An encouraging feature of the work is that over 98 percent of the properties on which the trees are grown are being cleared of Citrus trifoliata, including yard plantings and hedges, and an even larger percentage of all citrus trees are being removed. The exceptions are occasional trees left in yards for shade or fruit on request of the owners. These are easily accessible for future inspection, if necessary. There is no commercial citrus industry in this area and the removal of the trifoliatas from practically all properties will materially lessen the likelihood of the spread of any subsequent infections from property to property by means of birds, insects, and other agencies. In Louisiana five parishes, including the three in which canker was recently discovered, have been completely cleared of all trifoliata growth, numbering 385,000 trees. The abandoned plantings and escaped trees in this area have, in many cases, grown to a height of 20 feet or more, and have become so entangled with vines and other wild growth as to form a jungle inaccessible to inspection. C. trifoliata stock was planted in abundance some 20 years ago, when a citrus enterprise was launched in southern Louisiana and the Galveston-Houston area, to produce Satsuma oranges on rootstock of the cold-resistant trifoliata. Such stock was originally imported from Japan and was the means of introducing citrus canker into this country. Freezing weather in later years killed the Satsumas but the trifoliata rootstock proved so hardy as not only to resist the cold but also to "turn native", and reproductions have occurred miles from points of original planting. In the lower Rio Grande Valley exist many old nurseries of sour orange stock, long since abandoned. Such growth, if allowed to persist, could easily harbor disease for years without being detected, consequently relief labor is being used to destroy this stock. More than 1½ million citrus trees from 564 properties have been destroyed. The project in the two States has provided 183,797 man-hours of employment for relief workers.

Transit inspection force strengthened for Christmas shipping.--Through the cooperation of other divisions of the Bureau, 12 additional inspectors have been assigned to assist in the inspection of winter shipments for compliance with Federal domestic plant quarantines, with special attention to the movement of Christmas trees and Christmas greens from the gypsy moth areas of New England.

More quarantines are violated in fall shipping.--Transit inspection at railway points shows no material increase in the number of shipments that constitute infringements of Federal quarantine regulations. It is noted, however, that an increased number of the quarantines were involved in the uncertified shipments intercepted. Violations of quarantines relating to the Thurberia weevil, the pink bollworm of cotton, the Mexican fruit worm, the black stem rust, the white pine blister rust, the gypsy moth, and the Japanese beetle have been intercepted by transit inspectors this fall. One hundred and six violations were reported in November.

Progress in phony peach disease eradication.--More than 4 million worthless peach trees had been eradicated to the close of November by relief workers on the phony peach disease project, according to William F. Turner, Bureau field leader, in a summary of the season's work. The project has been extended to Illinois and Missouri, and includes eradication in over one hundred counties in Georgia, Alabama, Arkansas, Mississippi, Louisiana, North Carolina, South Carolina, Tennessee, and Texas. The man-hours for the season have totaled 707,420, and the work will be continued during the remainder of the winter.

CONTROL INVESTIGATIONS

Beans fumigated in freight cars with HCN.--A series of tests on bean fumigation with HCN has recently been completed at North Kansas City, Mo., by A. C. Johnson. Carload lots of sacked beans were fumigated in freight cars with dosages of 10, 12, and 14 pounds of HCN per car, using 40-foot cars. The fumigation period was 24 hours. The temperature of the material ranged from 39° to 45° F. Bruchus obtectus Say, B. pisorum L., and Callosobruchus maculatus Fab. were used. Some 300 samples of this fumigated material are now under observation at Beltsville, Md. The results of the tests to date show that it is useless to attempt this type of fumigation for beans under low-temperature conditions. The tests also show the importance of the type of car used for fumigating as well as of wind velocity. Specimens of B. obtectus have survived all fumigations.

Cigarette beetles in tobacco can be killed in commercial cold storage.--Studies made by M. C. Swingle, Beltsville, Md., on the effect of low temperature on the cigarette beetle have shown considerable variation in resistance among the larvae. Freezing-point determinations were made by means of a thermocouple, and considerable variation was found in the actual crystallization point of different individuals. Full-grown larvae, pupae, and adults froze at about 17° F. Studies were also made on the rate of cooling of bales of cigar tobacco and hogsheads in a Richmond, Va., storage plant. From daily thermocouple readings, it was found that the center of bales of cigar tobacco cooled from about 62° to 12° in approximately 7 days. A standard hogshead of tobacco required 21 days for the same decrease in temperature. From these investigations, which are being made in cooperation with W. D. Reed, in charge of the Bureau's work on tobacco insects, it is intended to determine the feasibility of eliminating infestations of the cigarette beetle in certain tobaccos by placing them in commercial cold storage.

Ovicidal action of nicotine and other contact insecticides.--Studies on the ovicidal action of various compounds are being made by H. H. Richardson, Beltsville. House fly eggs are now being used, as these can be obtained in large numbers and have a short incubation period. The eggs are dipped in various mixtures, filtered off, and incubated in Petri dishes. Free nicotine, nicotine sulphate, and a number of other water-soluble nicotine compounds, have so far shown little toxicity to house fly eggs, even at high concentrations. Highly refined petroleum-white oil emulsions have also shown little toxicity, even where high concentrations of nicotine are added. The pyrethrins are somewhat more effective than nicotine, although not very toxic. Water suspensions of derris extracts have, however, shown a very decided ovicidal action on these eggs.

Quantitative study of toxicity of nicotine.--N. E. McIndoo, Beltsville, is continuing the use of a micrometer syringe to inject insecticides into insects. Dosages of 0.00124 cc of nicotine solutions, ranging from 1/32 to 3 percent (0.0004 mg of 100 percent nicotine), were injected into blowflies with an error not to exceed 4 percent. Independent of body weight, adults and larvae differ in susceptibility to nicotine. Flies 16 days old are six times as susceptible as flies 5 days old. A dosage as small as 0.0004 mg of nicotine completely paralyzes flies, stimulating at first, then depressing. It was found that nicotine is more toxic than nicotine sulphate, both having the same nicotine content. This injecting method has proved to be a quick and extremely accurate way of quantitatively determining the toxicity of nicotine solutions, and it can probably be used to inject other soluble insecticides.

Method for counting house fly eggs.--A simple method is needed to control the number of house fly eggs to be added to a given volume of culture medium. W. N. Sullivan, Beltsville, following the procedure of H. H. Richardson, breaks up the egg masses by shaking them in water, and pours the suspension of eggs rapidly into a Buchner funnel under suction. The eggs are fairly uniformly distributed on the filter paper. By counting the number of eggs on small sample areas of the paper, the area of paper bearing the desired number of eggs can be determined, cut out, and dropped upon the medium.

Effect of pure arsenates of calcium on bean foliage.--In the News Letter dated August 1 (vol. 2, No. 8, p. 23), it was stated by J. W. Bulger that the toxicity to the silkworm of certain pure arsenates of calcium depended on whether or not they contained water of crystallization, the hydrated forms being more toxic than the corresponding anhydrous forms. The same relative toxicity to bean foliage was recently found by Mr. Bulger in preliminary tests in the greenhouse at Beltsville.

BEE CULTURE

Annual meeting of Southern Beekeepers Federation.--The Southern Beekeepers Federation held a large and enthusiastic meeting at Nashville, Tenn., on December 2 and 3. Topics of special interest to queen breeders and package-bee producers were listed on the program. The Governor of the State spoke at one of the sessions. The next meeting will be held at San Antonio, Tex. The Division of Bee Culture was represented by Jas. I. Hambleton, Washington, D. C., C. L. Farrar, of the Laramie, Wyo., laboratory, and Warren Whitcomb, from the Baton Rouge, La., laboratory. After the meeting, Mr. Hambleton went to Baton Rouge to discuss the supersedure work with the personnel of that laboratory. Mr. Farrar also participated in this conference.

Tahiti requests removal of restrictions.--A request has been received from official sources in Tahiti that the present restriction on the importation of queen bees into the United States be removed insofar as it applies to Tahiti, on the ground that the mite causing the Isle of Wight disease is not present on the island; that no bees have been imported in recent years; and that an embargo will be placed on future importations. As it is reported that the only race of bees ever imported into Tahiti is the Italian, it is maintained that the present stock consists entirely of unhybridized Italian bees. E. L. Sechrist, formerly of this division but now living in Tahiti, is engaged in rearing queens there.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Lesser clover weevil recorded from Nevada.--Three specimens collected by C. W. McBeth at Reno, Nev., and recently submitted for identification, have been determined by L. L. Buchanan as Hypera nigrirostris Fab. Mr. Buchanan reports that the Museum collection contains a number of Pacific coast specimens sent in from Washington, Oregon, and California, but that these appear to be the first specimens received from Nevada.

A huckleberry-infesting tortricid in the Northwest.--Specimens of moths reared from larvae found infesting fruits of Vaccinium ovatum, the northwestern evergreen huckleberry, at Gig Harbor, Wash., have been identified by August Busck as Lotisma trigonana Walsingham. This interesting species has been received for identification from the Northwest a considerable number of times, but this appears to be the first record of a definite host-plant association.

Identity of certain plant-boring Noctuidae of the genus Apamea.--Numerous specimens of moths belonging in the genus *Apamea*, the larvae of which are borers in plants, have recently been received for identification from various sources and have been determined by F. H. Benjamin as follows: (1) *Apamea nictitans* L. This is a European species recorded from the roots of grasses. As used by American authors the name is largely referable to *Apamea americana* Speyer, whose normal biology is unknown, but which occasionally attacks corn, and may be confused, in the larval stage, with other corn-boring larvae. The only known example of the true *nictitans* supposedly from a North American locality is a specimen received from the Brooklyn Museum and labeled "Prospect Park, Brooklyn, N. Y." (2) *Apamea interoceanica* Smith. This name has usually been incorrectly applied to Manitoba examples of the true *americana* and considered a variety of *nictitans*. It proves to be a valid species, however. Its larva is a borer in the crown of strawberry plants and as early as 1886 was noted by Pergande (manuscript notes) as doing much damage in Summit County, Ohio, although then identified as "? *Mamestra*" and subsequently as "*Gortyna nictitans*." This strawberry borer has a wide distribution, specimens having been identified from the following general localities: Manitoba and Alberta, Canada; New Hampshire; Massachusetts; New York; Pennsylvania; New Jersey; Virginia; and North Carolina. (3) *Apamea keiferi* Benj. Originally described from California, this species, which is closely related to the preceding, was recently identified for S. E. Crumb, of the Puyallup, Wash., laboratory, who reported it as a borer in iris at Tielton, Wash. Additional Washington specimens were submitted by A. R. Rolfs, and material from Utah has been identified for A. G. Richards. This species should not be confused with the well-known iris borer (*Macronoctua onusta* Grote).

A dipterous parasite of the black widow spider.--On several occasions recently a dipterous parasite of the black widow spider has been received for identification from southern California and has been determined by David G. Hall as *Pseudogaurax signata* Loew, a species of Chloropidae. This parasite has been known to develop in the egg sacs of several species of spiders, but seems not to have been previously recorded from the black widow spider.

First record of host association for an unusual serphoid genus.--In material received for identification from the Division of Truck Crop and Garden Insects were included three specimens reared by B. J. Landis at Columbus, Ohio, and recorded by him as tertiary parasites of *Epilachna corrupta* Muls. They have been identified by C. F. W. Muesebeck as a new species of *Myrmecopria*, a very unusual genus of Serphoidea belonging to the family Diapriidae. Up to this time the genus has been known only from the unique type of *Myrmecopria mellea* (Ashm.) collected in Florida.

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DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE NEWS LETTER

VOLUME III

ALLOTMENT LEDGER (COPY)

Standard Form 1015B
APPROVED BY COMPTROLLER GENERAL U. S.
May 28, 1926

SHEET No. 1

SALARIES AND EXPENSES

SYMBOL: 36450.47 BU. OF ENTOMOLOGY AND PLANT QUARANTINE 1936 13 TRAVEL ALLOTMENT H J BROWN LA 28 BOSTON MASS

FOREST INSECTS

GOVERNMENT PRINTING OFFICE 10—1739

PREVIOUS BALANCE	SYMBOL	DATE	REFERENCE NO.	DESCRIPTION	REPAYS	AUDITED VOUCHERS	ENCUMBRANCES		TRANS-PORTATION REQUESTS	ALLOTMENTS	UNENCUMBERED BALANCE OF ALLOTMENT
							LIQUIDATED	AUTHORIZED			
		1935			+	-	+	-	-	+	
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217 17	4701.12	8/4		PERRY GREEN GAR 7/9-19				12 39			204 78▲
204 78	4701.12	8/20		NEW ENG T & T 7/1-31				2 50			202 28▲
202 28	4701.12	8/24		H J BROWN 7/1-31				4 25			
				S D HARDY 7/1-31				3 75			194 28▲
194 28	4701.12	8/27		IMPROVED MAIL CASE 7/4				4 95			
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178 80	4701.12	9/16	V-4229	NEW ENG T & T 7/1-31		2 50	2 50				178 80▲
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181 05	4701.12	10/6		NEW ENG T & T 8/1-31				2 50			178 55▲
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144 88	4701.12	10/24	V-4987	IMPROVED MAIL CASE CO 7/4		5 00	4 95				144 83▲
144 83	4701.12	10/25		NEW ENG T & T 9/1-30				2 50			
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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR DECEMBER 1935

Vol. III, No. 2 (Not for publication) February 1, 1936

FOSTER H. BENJAMIN

Foster H. Benjamin, Associate Entomologist on the staff of the Division of Insect Identification, died at Georgetown Hospital in Washington, D. C., early January 24, after an illness of about ten days. Pneumonia was the cause of death. Mr. Benjamin was born in Brooklyn, N. Y., September 17, 1895. His undergraduate studies at Cornell were interrupted by service in the lighter-than-air aviation unit of the Navy from April 1917 until the end of the war. He obtained a B. S. degree from Cornell in 1920, and an A. M. degree the following year from the same institution. In 1921 and 1922 he was assistant entomologist of the Mississippi State Plant Board, and from 1922 to 1927, curator of the William Barnes Museum at Decatur, Ill. Following this he was associated with the investigations on the Mexican fruit fly at Brownsville, Tex., being attached to the Plant Quarantine and Control Administration; and in 1929 he was transferred to Florida where he had an active part in the campaign against the Mediterranean fruit fly. Finally, in 1931, he joined the taxonomic staff of the Bureau at Washington, being stationed at the National Museum. Here he remained until the time of his death. In 1920 he married Mary Anne Sheridan, of Ithaca, N. Y., who, with their two children, Richard, aged 13, and Mary Julia, aged 6, survives him. From boyhood, Mr. Benjamin collected and studied Lepidoptera, and he had become an outstanding authority in North American Noctuidae. In recent years he had, in addition, conducted intensive studies on the taxonomy of Trypetidae, especially the genus *Anastrepha*. His untimely death is greatly regretted.

ACCOUNTING OFFICE LEDGER SHEETS

A number of inquiries have been received concerning the entries on the bookkeeping sheets furnished the various divisions by the accounting office of the Bureau. On the opposite page appears a sample sheet. A study of this sheet may answer some of the questions arising in field offices concerning the status of vouchers which would otherwise have to be taken up by correspondence.

At the top of each column a plus or minus sign has been typed to show the way in which entries made in any particular column affect the balance of the account. An explanation of the meaning of the various columns may be of assistance.

When a voucher is received in the Bureau accounting office, it is entered in the authorized column for the amount claimed by the payee and this amount is deducted from the previous balance. When the voucher is finally audited and paid by the Treasury Department, it is entered on the bookkeeping sheets again, but this time the amount is shown in the audited column and in the liquidated column. This second posting will not affect the balance if the voucher is paid in the exact amount claimed by the payee (i.e., the amount previously entered in the authorized column). Such a case is illustrated on line 19, voucher 4229. If the amount appearing in the audited column is less than that appearing in the liquidated column, as on line 15, voucher 2769, the balance will be increased by the amount of the difference; but if the amount appearing in the audited column is more, as on line 28, voucher 4987, the balance will be reduced accordingly. In other words, an entry in the authorized column indicates that the voucher has been received in the Bureau accounting office and charged in the amount stated. The primary purpose of this entry is to insure the prompt setting up on the books of the proper liability, so that the allotment will be protected against overdraft, even if the voucher should be long delayed in audit and payment. An entry in the liquidated column actually cancels the authorized-column entry and the audited-column entry shows the amount finally approved. Therefore, entries in these two columns or in all three columns simultaneously indicate that the voucher has been audited and forwarded to the Disbursing Officer for payment.

Entries in the transportation-request column cover travel performed on transportation requests and are made from the memorandum copy of requests. It is important that travelers forward these copies promptly so that a charge may be made against the proper account to cover the obligation incurred. The transportation-request column is really only another form of authorized column.

When an account has been paid and there is subsequently a refund of all or a portion of the amount paid, this entry is made in the repay column and adds to the balance of the allotment, as shown by the entry on line 22, entered under date of October 5.

The manner of making a correction is shown in connection with the entry of August 27, voucher 60, for the "Chevrolet Motor Company." As will be noted, this voucher was authorized on July 31 for 54 cents, which amount was subtracted from the balance at that time. This particular voucher is now being paid for 54 cents, which is entered in the audited column. This again subtracts from the balance and since it is the final figure for which the account is paid, another entry is necessary to liquidate the previously authorized figure. In this particular instance, 52 cents was erroneously entered in the liquidated column. When this was discovered, the entry was marked "error", a minus 52 cents entry marked "correction" (that is correction of error) was made; then the correct amount, which is 54 cents, was posted. The 54 cents in the liquidated column offsets the 54 cents in the authorized column and, therefore, the balance is not affected.

The entry on line 18, "S. D. Hardy", posted September 15, shows the correction of an item which was entered on this account through error. The entry of the minus figure cancels the entry of the previous figure in the same amount, and therefore reduces the authorized column and increases the amount of the balance.

Cash-discount vouchers are posted in all three columns at the same time, as illustrated by the entry of the "Perry Green Garage." (See voucher 4704, October 8.)

A reduction in allotment is effected by entering a minus figure in the allotment column, which of course subtracts from the balance. (See entry under date of October 16.)

Ledger sheets indicate whether any suspensions have been made from a voucher. This can be ascertained by examining the amounts posted in authorized and audited columns. The payee is advised of any suspensions made, in the form of a Preaudit Difference Statement issued by the Comptroller General of the United States and addressed direct to the payee. This statement does not accompany the check to the payee, but is forwarded in a separate envelope.

In connection with this discussion of ledger sheets, it might be well to say a word concerning overdrawn allotments. All of the obligations against any particular allotment account are entered on the books as soon as received in the accounting office, provided there is sufficient balance in the certifying officer's allotment to cover the liability. If there are not sufficient funds, it is necessary to hold the vouchers until funds are made available, since if this procedure is not followed there is possibility of incurring a deficiency in appropriations, which is unlawful. Therefore, if delays in settlement of accounts are to be avoided, the officer certifying vouchers must see to it that the funds to the credit of his allotment are sufficient to cover the accounts he submits.

FRUIT INSECT INVESTIGATIONS

Package fumigation of raisins.--Charles K. Fisher, of the dried-fruit insects laboratory at Fresno, Calif., has found that a new commercial mixture of ethylene dichloride and ethylene oxide, 3 parts to 1, by volume, was effective in killing larvae of the raisin moth (Ephestia figulilella Greg.) when used at the rates of from 5 to 9 cc per 25-pound fiber box of seedless raisins. The liquid was sprinkled on the paper-bag liner of the boxes just before the raisins were introduced.

Codling moth control from banding and orchard sanitation.--L. F. Steiner, in charge of the Vincennes, Ind., laboratory, has reported on two projects on the control of the codling moth by means of certain measures other than spraying. A. J. Ackerman was in immediate charge of one of these projects, which was carried on at Elberfeld, Ind., and constituted a continuation of work started in the spring of 1934. Half of a 40-acre orchard was cleaned up and banded and the remainder was left untreated. The treatment resulted in an average reduction in worm population of 41.9 percent on the basis of worms per 100 apples and 13-1/2 percent on the basis of worms per tree. The actual control effected was intermediate between these two figures. The results in 1935 continued to be favorable, giving an average reduction of 57 percent in injuries per 100 apples and of 45 percent in worms per tree. Incidentally, the early destruction or removal of ground debris apparently reduced very materially the injury caused by the apple flea weevil, which hibernates in trash on the ground. In a second experiment, started in the spring of 1930, a 6-1/2-acre block was used. All of the trees were scraped and banded with chemically treated bands supplied by E. H. Siegler, of the Beltsville, Md., laboratory. The ground debris was not cleaned up but bait traps were maintained in all trees in this area, which was compared with an adjacent similar block of the same size, receiving none of the control measures mentioned. The combination of scraping, banding, and baiting apparently reduced the infestation at least 50 percent.

Ethylene dichloride emulsion for peach borer control.--Oliver I. Snapp and J. R. Thomson report that ethylene dichloride emulsion was the most effective, cheapest, and under the conditions of the fall of 1935 proved to be the safest, of all the materials used in experiments on the control of the peach borer at Fort Valley, Ga. The following dosages of ethylene dichloride emulsion gave best results: Nursery stock, 1/4 pt. of 4 percent concentration; 1-year-old trees, 1/4 pt. of 10 percent;

2-year-old trees, 1/2 pt. of 5 percent; 3-year-old trees, 1/2 pt. of 10 percent; 4-and 5-year-old trees, 1/2 pt. of 15 percent; 6-year-old trees, 1/2 pt. of 20 percent. The ethylene dichloride emulsion caused less injury than other materials. Applications made during the period October 20-25 were more effective, and in some cases safer, than those made during the period October 10-15, the time now recommended for peach borer control in this latitude.

MEXICAN FRUIT FLY

Fruit flies increase, despite weather.--Rather cool and inclement weather over most of the lower Rio Grande Valley during December slowed up inspection work generally. According to weather reports, there were 14 days in the month on which some rain fell at Brownsville. It would appear that this factor might have been responsible for the decrease in the number of Anastrepha ludens Loew trapped had other species decreased proportionately. This, however, was not the case, as all other flies generally taken, except A. pallens Coq., were found in increased numbers throughout the month. Adult A. ludens trapped totaled 8 from 8 premises. Larvae, totaling 112, and 3 pupae were collected from fruit and soil on 4 premises. Only 2 of these infestations were new for the month and not previously reported.

DATE SCALE CONTROL

Progress of work during December 1935.--In the Coachella Valley, Calif., 2,388 palms were inspected from ground and ladders and 743 from the ground only. This completes all ladder work in the valley and all inspection in 10 of the 12 districts. Leaf bases were removed from 17 previously infested palms, and 27 palms were dug out and destroyed in a previously infested seedling garden. In the Imperial Valley 626 palms were inspected from ground and ladders and 58 from the ground alone. Systematic inspection by districts was discontinued. Properties needing further attention were listed and the remainder dropped. No scale was found in the Imperial Valley during the year. The last scale was found in February 1934.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Parasitization of European corn borer by introduced species apparent in eastern New England.--D. W. Jones, of the European corn borer sublaboratory at Melrose Highlands, Mass., reporting on the status of parasitization of the European corn borer in the two-generation area at the close of the 1934 season, and in relation to the first generation in the summer of 1935, says that all field samples of hibernating corn borers collected in the fall of 1934 were taken on a section-random basis, each sample consisting as far as practicable of four subsamples of 25 borers, from the approximate center of the four quarters of the field under observation. The results are shown in the following table.

Locality	Samples	Area surveyed	Parasitization by--				
			Lydella stabulans var. grisescens R. D.	Inareolata punctoria Roman.	Macrocentrus gifuensis Ashm.	Native species	Total
	No.	Sq.mi.	Percent	Percent	Percent	Percent	Percent
Bridgewater, Mass-	7	28	2.3	- -	*0.6	0.6	3.5
Concord, Mass-----	7	28	0.9	5.2	--	.3	6.4
Falmouth, Mass----	7	28	11.0	1.9	--	--	12.9
Malden, Mass------	28	153	4.7	10.5	--	.1	15.3
Hartford, Conn----	10	28	*1.3	*0.3	--	.4	2.0
Milford, Conn-----	10	28	*.3	--	--	.5	.8
Portsmouth, R. I--	7	28	1.1	.5	--	.2	1.8
Providence, R. I--	7	28	5.5	--	--	.3	5.8
Long Island, N. Y-	28	112	*1.8	*.1	--	--	1.9

*First recovery.

The recovery of M. gifuensis (oriental strain) at Bridgewater, Mass., is the only record of this strain having become established in the two-generation area. Releases of this strain were made in Bridgewater in 1931 and 1932. All recoveries at Hartford and Milford, Conn., followed first releases in the respective localities in the summer of 1934. The total parasitization of 15.3 percent observed at Malden, Mass., including 10.5 percent by I. punctoria and 4.7 percent by L. stabulans grisescens, was found to be distributed generally over the 153 square miles included in the survey. In addition to the recovery records presented in the above table, Chelonus annulipes Wesm., an egg-larval parasite imported from Italy, was recovered for the first time at Dighton, Mass., where no releases had been made since 1929. In the Malden district, where the earliest releases of corn borer parasites were made, the parasitization has always been highest on the borers of the first generation. The following table shows the percentages of parasitization of first-generation borers in the summer of 1935 at 2-mile intervals from the center of the Malden releases, extending outward for a distance of 13 miles. Each area inspected therefore represents a ring two miles wide. A total of 8,100 borers were found.

Area inspected	Borers	Parasitization by --			
		L. stabulans grisescens	I. punctoria	Native species	All species
	Number	Percent	Percent	Percent	Percent
Center--	100	1.0	12.0	--	13.0
1-----	500	2.2	38.2	0.6	41.0
2-----	1,120	3.8	27.3	.6	31.7
3-----	1,049	3.2	25.3	1.2	29.7
4-----	1,535	2.5	25.1	1.4	29.0
5-----	1,596	2.1	25.8	.4	28.3
6-----	2,200	1.9	17.0	.5	19.4

Bathyplectes tristis Grav. as an internal larval parasite of clover leaf weevil.--According to F. F. Dicke, of Arlington Farm, Rosslyn, Va., a brief account of Hypera punctata Fab., based on observations from March 27 to July 1, was given in the quarterly report for April-June 1935. Collections of cocoons of the species were made at 2- to 3-week intervals throughout the summer and early fall. On September 28 the first prepupal stage was found in a cocoon collected on August 9. On October 4, two cocoons collected on October 3 contained a white and a dark pupa, respectively, an adult emerging from the latter on October 7. On the same date an adult emerged from a cocoon collected on May 20. The adults were common in sweepings on alfalfa and red clover throughout October. The young larvae were found in the H. punctata larvae in November and December. The species was identified by R. A. Cushman, of the Division of Insect Identification, with the statement that this is the first record of the species in the United States.

Low damage to crop by sugarcane borer in 1935.--J. W. Ingram, of the Houma, La., laboratory, reports the following: "This season a new survey system was instituted which consisted in dividing the Louisiana sugarcane section into ten districts, each of which produced around 320,000 tons of sugarcane in 1934. All of the area in each district was known to have about the same degree of borer infestation in past years. Status counts were made on one representative plantation in each district. Infestation counts were made in the varieties Co. 290 and Co. 281, the former being the most common of the lightly infested varieties and the latter the most common of the heavily infested varieties. Joints bored externally were counted in 200 stalks selected in random lots of 10 each in a field of each variety in the front part of the plantation and the same number of stalks of each variety were examined in a field in the back of the plantation. This gave 800 stalks per plantation. Comparison of data obtained by H. A. Jaynes and E. K. Bynum in Trichogramma work showed that the number of joints bored internally was very nearly the same as those bored externally. It is conservatively estimated that there is at least an equal percentage of field loss for every bored joint resulting from the stand of cane being diminished by bored seed cane, plants killed, decreased weight of the bored stalk, and wind breakage. This gives 9 percent injury for each bored joint. The Bureau of Agricultural Economics crop report published December 21, 1935, estimated the value of this year's Louisiana sugar crop at $14,875,000, exclusive of Federal farm benefits. From these figures it is estimated that a loss of $1,400,000 resulted from borer injury in 1935. Borer injury in 1935 was the lowest since 1919, apparently owing to the unusually cold winter that preceded the crop.

Discovery and eradication work on West Indian sugarcane mite.--Mr. Ingram also reports that on October 7, rusty, blisterlike areas were found on sorghum crosses growing in experimental plots at the Houma laboratory. Mite nymphs were found between the leaf sheaths near the top of the infested plants and adults were found embedded in the tissues beneath the blisters. Specimens were forwarded for determination and were found by H. E. Ewing to be Tarsonemus bancrofti Michael. Mites were found only in the area in and around where the sorghum crosses were growing at Houma and on a few plants in the greenhouse. The field area actually infested was about 20 by 30 feet in size. Owing to the small area infested and the possibility of much damage, eradication was considered desirable. An area 90 by 60 feet, which extended to all sides of the infested plants, was treated. This work was conducted in October. Although Digitaria sanguinalis and Panicum reptans were growing in the infested area, the mites were found only on sugarcane.

FOREST INSECT INVESTIGATIONS

Denver laboratory moved to Fort Collins.--In October the forest-insect laboratory was moved to Fort Collins, Colo. J. A. Beal continues in charge. The space now occupied by the laboratory has been offered rent free by the Colorado State Agricultural College. The Rocky Mountain Forest and Range Experiment Station is also occupying quarters owned and donated by the college. At the completion of the new Forestry Building about May 10 both of these organizations and the Colorado Forestry School will occupy space in the new structure.

Plectrodera scalator Fab. damages cottonwood in shelterbelt plantings.--During a trip through the shelterbelt region of Kansas early in December N. D. Wygant, of the Fort Collins laboratory, observed injury by the cottonwood borer (P. scalator) to the cottonwood trees planted this spring in the 4 miles of shelterbelt strips near Larned, Kans. From 40 to 50 percent of the young cottonwoods were killed by this borer during the summer and many of the remaining trees are so severely injured that they may not survive. The activity of the larvae next year will also increase the loss. The young cottonwood trees, 1 year old when planted in the spring of 1935, make up five rows in each of the strips planted at Larned. By the fall of 1935 the trees were from 3 to 6 feet high and 0.4 to 1.0 inch in diameter at the base. The very small cottonwood showed egg scars at the base but no work of the larvae. The injury caused by the adult beetles in making the egg scars sometimes kills small trees, especially if two or more scars are made on a single tree. The larvae work in the trees near the ground level and cause a calloused swellinglike growth. The diameter at the swelling may be nearly twice that a few inches above. The larvae at the time of observation were from 1/2 to 3/4 inch long and were boring in the wood. In Oklahoma, where damage has also been heavy, the adults were flying and laying eggs up to the middle of September.

Bark beetle surveys in California show improved conditions in 1935.--As reported by J. M. Miller, of the Berkeley, Calif., laboratory, the annual surveys conducted by the forest-insect laboratory were completed by November 1. A total of 40 half-section plots were covered intensively by the 1935 survey, as compared to 48 in 1934. The area covered by extensive reconnaissance methods, however, was practically the same as before. Conditions found in the west-side type of central California show that the decline of infestations of the western pine beetle and mountain pine beetle, which became apparent in 1934, continued during 1935. Losses in sugar pine were extremely light in all areas. The same is true of ponderosa pine, except for two areas in the southern part of the Sierra

Forest, where increases of from 200 to 300 percent occurred. One small area in the marginal type of the Stanislaus National Forest was also found, where a sharp increase developed contrary to the general trends of 1935. In the east-side ponderosa type of the Modoc, Shasta, and Lassen National Forests the peak of severe losses caused by the western pine beetle occurred in 1934. Throughout this belt there was a general drop in losses in 1935 of about 30 percent.

Seasonal history studies indicate break in western pine beetle epidemic late in the summer of 1935.--Mr. Miller also reports that studies including the relation of brood development to bark and air temperatures were continued at the Hackamore laboratory on the Modoc National Forest from March 1 to October 30. Although the spring emergence of the overwintering broods was about 2 weeks later than in 1934, brood development caught up with this lag in 1935 and the beetles completed two seasonal generations and started a partial third, which went into the overwintering condition. Quantitatively, however, the infestation followed a very different course from that of 1934. In the seasons of 1933 and 1934 each generation increased in population over the preceding one. This tendency to increase apparently culminated in the spring of 1935, when a very heavy population of the western pine beetle emerged throughout the east-side ponderosa pine areas. Instead of the widely scattered attacks that characterized the infestations of 1933 and 1934, the first seasonal generation of 1935 concentrated in large groups of trees. This grouping habit of attack was also followed by the second seasonal generation. However, with the attack of the third generation there was a very marked falling off in numbers and the attacking habit again became selective and scattered. At the height of the group attacks, trees of all age classes and vigor were taken and, as a result, the average volume of infested trees declined from that of preceding years, when the beetles showed a tendency to select large, overmature, and slowly growing trees. This habit of group attack just before an epidemic starts to decline has been observed in the majority of the western pine beetle cycles that have been studied. The decline of the recent epidemic in northeastern California was expected in 1935, as various factors indicated that this point had been reached in the cycle.

Salvage cutting reduces western pine beetle infestation on Lassen National Forest.--P. C. Johnson, Berkeley, reports that the Fruit Growers Supply Company, cooperating with the Forest Service and the Bureau of Entomology and Plant Quarantine, carried on an experimental salvage operation near Susanville, Calif., in 1935. The purpose of this work was to determine the feasibility of logging and manufacturing insect-killed timber under existing conditions. The Berkeley laboratory, in order to follow the entomological phases of the program, established a 320-acre sample plot on the salvage area. This sample plot was first cruised late in June when the cutting of infested timber was started. Another cruise was made in September, when it was found that the infestation in the salvage zone had been materially reduced. Timber losses that developed during the progress of the cutting in July and August were only about 40 percent of those outside the salvage zone. This was apparently due to the breaking up of tree groups while the attack was forming and to the removal of beetles from the woods by carrying them out to the mill in infested logs. Although it is too early to draw definite conclusions, indications are that salvage cutting during the summer period and removal of infested logs from the woods may have a beneficial effect in reducing seasonal losses.

Fir engraver increasing in California fir forests.--According to Mr. Miller, recent surveys in California have revealed a decided increase in infestations of the fir engraver beetle. The dead and dying white firs are particularly noticeable to anyone traversing the fir type throughout many areas of the State. Much of the loss occurs as top-killing although many trees are being killed outright. Scolytus ventralis Lec. is one of the most important insect enemies of white fir in California and the timber losses for 1935 will be heavier than any during the last five seasons.

European spruce sawfly.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports that the last field observations on Diprion polytomum Htg. were made on December 3. Cold weather the last week in November had apparently killed all the larvae that had survived the earlier cold periods. Larval mortality is heavy late in the fall in Connecticut. Larvae reared in the laboratory from eggs laid on December 4, 5, and 6 were nearly full grown on December 31. They were reared at room temperature, which ranged from 60° to 75° F., and at a humidity which remained fairly constant at 30 percent.

Parasites of larch sawfly.--P. B. Dowden, New Haven, presents the following table which shows the results of dissection of samples from five more lots of Nematus erichsonii Htg. cocoons received from L. W. Orr in Michigan.

Source of material	Nematus erichsonii Htg.					
	Received	Dis-sected	Alive	Killed by fungus	Containing Hymenoptera	Containing Tachinidae
	Number	Number	Number	Number	Number	Number
Huron National Forest (Luzerne Camp)	850	50	47	3	0	0
Huron National Forest (Tawas District)	700	50	48	2	0	0
Chequamegon National Forest	700	25	25	0	10	0
Nicolet National Forest	400	25	22	3	9	*1
Upper Michigan	285	25	22	3	9	1

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*Specimen dead.

Native elm bark beetle a vector of Dutch elm disease.--W. D. Buchanan, of the Morristown, N. J., laboratory, reports that the Dutch elm disease fungus has been isolated from 1 of 8 small elm trees into the bark of which adults of the native elm bark beetle (Hylurgopinus rufipes Eich.) had bored in constructing hibernation burrows. The beetles used in this experiment issued from elm wood infected with the fungus. Although the fungus had previously been isolated from beetles of this species collected in the field in an area where the disease was prevalent, and although it had been shown that beetles issuing from diseased material could transmit the fungus into elm wood, this is the first time the fungus has been isolated from a living tree which beetles from diseased wood had attacked under controlled conditions.

Nematodes infesting adult elm bark beetles.--C. H. Hoffman, Morristown, states that living adults of H. rufipes, collected in Connecticut and New Jersey, were found to be heavily infested with nematodes. Nematodes were also found in adults of the smaller European elm bark beetle (Scolytus multistriatus Marsh.) from New Jersey. Larvae of the two beetles from the same sources were not found to be infested.

Salvaging timber killed by southern pine beetle.--A marked improvement in the lumber markets during the past few months has made possible salvage operations of beetle-killed timber in nearby Virginia. At present three portable mills are in operation near Fairfax, salvaging what is left of some 5,000,000 board feet of mature shortleaf pine killed during the period 1931-34 by an outbreak of Dendroctonus frontalis Zimm., following the unprecedented drought of 1930. Probably about 1-1/2 million board feet will be saved. In much of the timber the sapwood is already largely destroyed by insects and decay. Poor markets and an oversupply of lumber during the depression prevented the timber from being salvaged while it was sound.

Termite control.--Termite control has developed into quite a big business during the past year. Because of keen competition, some of the companies engaged in this work have not hesitated to use unethical means of advertising or to exaggerate to the householder the seriousness of the situation, when such methods have helped to increase business. Furthermore, the chemicals used sometimes create fire hazards. In one instance two workers were overcome and a considerable loss resulted from fire damage. Recently there has been a tendency by some organizations to help remedy this situation and to fall in line with approved practices recommended by the Bureau of Entomology and Plant Quarantine. Some of the national organizations of these commercial companies have taken initial steps to eliminate unethical advertising and in so doing have requested the Bureau's aid. Better Business Bureaus have also cooperated and have published articles emphasizing that structural methods constitute the only permanent means of termite control. Many of the State Inspection Bureaus, particularly in the Middle Atlantic and Central States, have lately shown unusual interest in methods recommended by commercial concerns because of the possibilities of fire hazards.

GYPSY AND BROWN-TAIL MOTH CONTROL

Gypsy moth work summarized.--Up to December 15, 1935, under the W. P. A. projects, the following numbers of workers were employed under the gypsy moth projects in the different States as follows: Maine, 154; New Hampshire, 81; Vermont, 493; Massachusetts, 561; Rhode Island, 47; Connecticut, 599; New York, 170; New Jersey, 72; Pennsylvania, 731; total, 2,908. During the first week in December an average of 2,202 men, from C. C. C. camps, were employed on gypsy moth work in the area east of the barrier zone. They were assigned as follows: New Hampshire, 148; Vermont, 689; Massachusetts, 694; and Connecticut, 671. During this week over 46,000 gypsy moth egg clusters were destroyed, about 40,000 of these being in Massachusetts.

Accomplishments in brown-tail moth control.--Under the W. P. A. emergency project, the numbers employed on brown-tail moth work up to December 15 were as follows: Maine, 229; New Hampshire, 427; Massachusetts, 474; Rhode Island, 7; Connecticut, 16; total, 1,153. The numbers of brown-tail webs cut in various States up to November 30 were as follows: Maine, 39,544; New Hampshire, 39,490; Massachusetts, 19,783; total, 98,817. The numbers of trees cut up to November 30, these being mostly large wild cherry and old apple trees, were as follows: Maine, 11,295; New Hampshire, 29,592; Massachusetts, 79,041; Rhode Island, 20; total, 119,948. About 552 acres densely grown up in small wild cherry, beach plum, and other food trees, were cut over and all of the favored growth removed.

PLANT DISEASE CONTROL

Barberry eradication.--At the close of the week ending January 11, more than 1,200 men were employed in connection with the barberry-eradication program. In some States, particularly those west of the Mississippi River, severe winter weather has brought about a temporary suspension of field activities. In the Middle West and Lake States some rural eradication work was still under way; however, most of the crews have been assigned to survey work in the larger cities. Unless weather conditions during the latter part of January and February are unusually severe, it is expected that at least 1,000 men will be employed throughout the winter. A summary of the progress made in barberry eradication with emergency funds shows that since August 1933, more than 53,000 square miles of area in 17 States have been given a careful inspection, with the result that 5½ million barberry bushes have been destroyed on 13,250 properties.

Ribes eradication in southern Appalachian region, summary.--During the calendar year 1935 (up to and including November 30), a total of 3,791,289 *Ribes* bushes were eradicated in the seven States in this region where blister rust control work is being carried on. Virginia led in the number of *Ribes* removed, 1,311,672 bushes being destroyed in this State alone. A total of 1,063,663 acres were worked in this *Ribes*-eradication program and 30,345 man-days of labor were consumed. The above figures include work done under the W. P. A., the E. C. W., and the P. W. A. programs.

Winter blister rust control project in Northeastern States.--The major winter project scheduled for blister rust control under the W. P. A. program in the Northeastern States will consist of mapping pine and control areas. A total of 437 security wage workers will be employed on this work in 67 counties. The work will consist of locating white pine areas, preparing preeradication maps, mapping protection zones, and, where necessary, marking the boundaries of such zones in the field. The maps will be used by the crew foremen in conducting Ribes-eradication work in 1936 and will assist greatly in carrying out the work.

COTTON INSECT INVESTIGATIONS

Microbracon kirkpatricki Wilk. in relation to the boll weevil.--J. W. Folsom, Tallulah, La., has been studying M. kirkpatricki, a parasite of the pink bollworm introduced from Egypt, in relation to the boll weevil. During the past season complete details were obtained on the life history and habits of 596 parasites raised from the eggs on larvae of the boll weevil. In October cooler weather retarded development and the low temperatures in November stopped oviposition. No adults issued from cocoons after November 10. The adults are remarkably hardy. On January 2 more than 100 adults and several hundred cocoons were still alive, despite temperatures below freezing. On December 27 the temperature in the cages dropped to 16° F. M. kirkpatricki has proved to be more resistant to cold and a more effective boll weevil parasite than M. mellitor, the most abundant native species.

Boll weevils entering hibernation.--The number and condition of boll weevils entering hibernation this fall has, as usual, varied considerably in different sections. Late in the fall as the weevils entered hibernation they were reported to be more abundant than usual in the vicinity of Florence, S. C., and at College Station and Port Lavaca, Tex., but fewer than usual were reported from Mississippi, Louisiana, and Oklahoma. Although the number of weevils entering hibernation in the vicinity of Florence was greater than usual, the sudden freeze in November caused heavy mortality. The regular Spanish-moss examinations early in December showed 27.4 percent alive, as compared to 84 percent in 1934 and 77.6 percent in 1933. This fall 153 live weevils per ton of moss were found, as compared to 416 in 1934 and 111 in 1933. In the moss examinations at Tallulah, La., only 19 live weevils per ton were found, as compared to 192 in 1934, 365 in 1933, and an average of 317 for the last 10 years. An average of 31.4 percent of the weevils were alive in the moss examinations in the vicinity of Tallulah. The field observations and moss examinations were also substantiated by the catches on flight screens. An average of 15.5 weevils per screen were taken during October at Florence, in comparison with 7 and 11.5 weevils in 1934 and 1933. During October, November, and December an average of 15.2 weevils per screen were caught at Tallulah in 1935, 200 weevils in 1934, and 287 in 1933. The defoliation of the cotton by the leaf worm over large areas has undoubtedly reduced greatly the number of weevils entering hibernation this fall.

Overwintering pink bollworm in soil.--Examinations for determining the overwintering pink bollworms in the soil were made in December in 25 representative fields of the Presidio Valley by A. J. Chapman, H. S. Cavitt, and M. H. Hughs. Surface trash was removed and 5 square yards of soil from each field was dug to depths of from 3 to 5 inches. The soil was washed in screen boxes until only the trash remained, and this was then carefully examined for larvae. The population in the individual fields ranged from 1.4 larvae per square yard, or 6,860 per acre, to 43.6 per square yard, or 213,640 per acre, with an average of 12.51 per square yard, or 61,308 larvae per acre. Data on the soil population are available for 9 of the 25 fields for the years 1932-35. The average number of worms per square yard in these fields for the 4-year period was 1.01, 2.28, 1.37, and 13.46, respectively. The records for 1932 are hardly comparable because of the heavy floods before the examinations were made. The unusually heavy population this fall is probably due to the higher field infestation and the lower temperatures in September and October, which caused more worms to enter the long-cycle stage. Other tests were made to determine the overwintering population at various dates in October and November and at what dates the fields should be cleaned to reduce the soil population. Rows of cotton were stripped of all fruit on October 1, October 15, November 1, and November 15. (The frost date was November 12.) Soil samples from these rows yielded 6.4, 12.4, 20.6, and 26.4 larvae per square yard, respectively.

Pink bollworm insecticides tested.--The results of the insecticide tests for pink bollworm control, conducted by A. J. Chapman and associates at Presidio, Tex., last season, have been received. In a series of field plats barium fluosilicate and cube were used as dusts and sprays; a cube-sulphur mixture containing 1 percent rotenone as a dust, and a proprietary preparation as a spray. Insofar as possible, applications were made at 4-day intervals, dusting early in the morning and spraying in the afternoon. From 10 to 14 heavy applications were used. The degree of control was determined by the percentage of infested bolls, the number of worms per boll, the percentage of bolls with eggs, and the number of eggs per boll from samples collected every 2 weeks. The control obtained was poor with all the insecticides tested. In the plats dusted and sprayed with barium fluosilicate there was considerable reduction in the percentage of infested bolls early in the season, but this was decreased as the season advanced and the control was more evidenced by a reduction in the number of worms and eggs per boll. With the cube-sulphur dust there was no definite reduction in the number of infested bolls in some instances and practically no reduction in the number of eggs. The cube spray was slightly more effective than the barium fluosilicate spray in reduction of both worms and eggs, but was not as effective as barium fluosilicate dust. The proprietary preparation gave no indication of control.

Toxicity tests for tarnished plant bug.--The results of cage tests with several insecticides against *Lygus pratensis* L., conducted by G. L. Smith, J. C. Clark, and A. L. Scales, Tallulah, La., are summarized herewith. Cotton plants and weeds on which the insects normally occur were caged and dusted after the insects were introduced. Checks were used in each series, as the mortality in the checks was rather high and varied considerably. Derris root containing 4 percent rotenone killed 25 percent of the adults on weeds and 72 percent on cotton. Derris diluted with sulphur and clay was slightly more effective in the weed cages and less effective on cotton than was the straight derris. Pyrethrum containing 0.5 percent total pyrethrins and an activator killed 63 percent of the adults on weeds and 50 percent on cotton. Diluting pyrethrum with from 1 to 3 parts of sulphur and clay only slightly reduced its effectiveness. Sodium fluosilicate, either straight or mixed with equal parts of sulphur, gave approximately 40 percent kill on weeds and cotton. Phenothiazine, mixed 1 part to 9 parts of clay, killed 55 percent of the adults and was more effective than when used undiluted or diluted with sulphur. Calcium arsenate gave an average kill of approximately 38 percent of the adults when used undiluted and slightly better when mixed with sulphur, especially on weeds. Paris green killed 86 percent of the adults and 71 percent of the nymphs. When mixed with sulphur, 1 part paris green to 3 and 9 parts of sulphur, the kill was 61 and 58 percent of the adults and 77 and 71 percent of the nymphs, respectively. Sulphur alone killed 36 percent of the adults and 60 percent of the nymphs. The mortality in the check cages ranged from 10 to 36 percent and in most instances was higher in the cotton than in the weed cages.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--A considerable amount of gin trash was inspected in the Salt River Valley of Arizona during the first part of the month (December), these inspections being distributed generally throughout the valley. This area was first found to be infested with the pink bollworm in the fall of 1929 and, as a result of special control measures, the infestation was eradicated within the next two or three seasons. Inspections have been made each year since, and the continued negative results this year are a further indication of the success of the eradication program. A small amount of gin trash is still being inspected for pink bollworm in northern Florida, results being negative all season. In the Tucson area of Arizona gin trash is still being inspected, and a few additional Thurberia weevils are being found. All of the men previously operating gin-trash machines are now doing laboratory inspection at San Antonio, where the results have been negative to date.

Field clean-up in Big Bend of Texas.--Rapid progress has been made in the cleaning of cotton fields in the Big Bend area of Texas throughout December. This was largely due to the fact that picking was completed so that the acreage was available for cleaning. By the end of the month stalks had been cut on 1,524 acres, raking completed on 886 acres, and the material burned on 526 acres. It is thought that the clean-up will be completed by the middle of the coming month.

Road-station inspection.--During December four of the seven confiscations made at the Marfa, Tex., road station were found to be infested, 23 living and 1 dead larvae being found. All of the specimens were found in small lots of seed cotton, two of the lots being found in trucks, one in a mattress, and the remaining one in a pillow. Owing to the fact that the field clean-up in the Big Bend is so nearly completed, the road station was closed on December 31. During the 4 months the station was operated, 10 of the interceptions made were found to be infested and 336 living and 13 dead larvae were found, also 8 pupae.

Thurberia-plant eradication.--The eradication of Thurberia plants in southern Arizona with W. P. A. funds has continued to make good progress throughout the month. This work was begun about the first of September and at the end of December approximately 50,000 acres had been gone over and approximately 50,000 plants destroyed. Work is still being carried on in the Tortillita Mountains. It is thought that this range will be completed by the end of January, after which the work will be carried on in the Santa Catalina Range.

Wild cotton eradication.--The eradication of wild cotton in southern Florida is also being carried on this season with W. P. A. funds and very good progress was made during the month, except in the Cape Sable district. Thus far it has been impossible to obtain an adequate force of workers for this district. In December a recleaning was made on some 450 acres. From this area 117 mature, 99,168 seedling, and 1,067 sprout plants were removed. New colonies, involving 31 acres, were discovered; 9,035 mature and 6,035 seedling plants were removed; and a survey for additional wild cotton was made on some 5,500 acres.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Suction light trap efficient against cigarette beetle in tobacco warehouses.--W. D. Reed and E. W. Livingstone, of the Richmond, Va., laboratory, report that continued observations during the 3-year period from 1933 to 1935 in approximately 1,105,000 cubic feet of open-storage warehouses in Richmond, where 10 suction light traps have been operated, indicate, for the period ending December 31, 1935, a decrease of 86 percent in the population of the cigarette beetle, as compared to the number of beetles present during the first year the traps were operated (1933). The normal movement of tobacco in and out of the warehouses, as well as the activities of parasites and winter mortality, have undoubtedly affected the beetle population in these warehouses; however, the records obtained under practical warehouse conditions for the 3-year period involved indicate that the suction light traps have been of much value in reducing the beetle population.

Contact insecticides for rhododendron white fly.--Randall Latta, of the Sumner, Wash., laboratory, continuing laboratory studies on the control of Dialeurodes chittendeni Laing, tested alliphatic thiocyanate, both direct and in combination with oil, and nicotine sulphate against five lots of heavily infested rhododendrons. The results indicated that neither the alliphatic thiocyanate, applied direct, nor the nicotine sulphate were very effective, both giving an average mortality of approximately 40 percent. The alliphatic thiocyanate combined with the oil produced a satisfactory mortality, ranging from 86 to 100 percent. This result, however, only equals that obtained by the oil alone in previous tests, indicating that the thiocyanate was ineffective.

Derris effective in control of adult blister beetles.--K. B. McKinney, of the Phoenix, Ariz., laboratory, reports that in cage tests a derris dust mixture containing 1 percent rotenone with talc as a diluent proved effective in killing approximately 99 percent of the adults of the blister beetle Epicauta crassitarsis Maydell when the dust was applied as a contact insecticide. Beetle mortality continued to take place for 6 days after the treatment was applied.

Growth of strawberry seedlings stimulated by treatment for control of cyclamen mite.--F. F. Smith, of the Beltsville, Md., laboratory, reports that, after being treated with hot water for the control of the cyclamen mite, all infested strawberry seedling plants have developed new leaves free from injury. It is possible that the plants were stimulated into activity by the immersion in hot water (20 minutes at 110° F.); however, because of continued mite injury, they may not have reached a normal state of dormancy, and when this condition was relieved the new growth developed quickly. A sudden flush of growth following the killing of the mites, which may readily be taken for plant stimulation resulting from the treatment, has been observed on many other kinds of plants.

Derris dust controls squash capsid in Arizona, tests indicate.--K. B. McKinney, Phoenix, reports that recent field tests have demonstrated the efficiency of a dust mixture of derris and talc containing 1 percent rotenone in combating the squash capsid (Pycnoderes quadrimaculatus Guen.) on late squashes and cucumbers. Three applications of this material were made on September 24, October 2, and October 10, respectively. All plants involved in the tests were killed by an early frost, but yield records obtained prior to that time indicate an increase of approximately 67.9 percent of squash on the treated plants, as compared to the untreated checks, and practically a 100 percent increase in the yield of cucumbers, as no fruits had developed to a marketable stage on the untreated check plots up to the time they were killed by the frost.

Pea weevil control increases germination of seed peas.--A. O. Larson, of the Corvallis, Oreg., laboratory, reports that results obtained by airplane dusting with calcium arsenate dust against the pea weevil on Austrian field peas in Oregon during the growing seasons of 1933 and 1934 show a reduction in the population of adult weevils in dusted fields, as compared with the same fields before they were dusted and with other comparable fields in the same locality which were not dusted. Tests of peas harvested from the fields dusted with calcium arsenate showed that germination averaged 90.6 percent, as compared to an average of 78.4 percent germination from the fields not dusted. This development constitutes an important factor in the production of seed, because regulations require that first-class seed should show a germination of 90 percent or higher. Apparently the difference in germination is directly attributable to the difference in weevil infestation in the two series of fields involved, since detailed studies have demonstrated that there is a direct correlation between the degree of weevil infestation and the percentage of germination of peas.

Cigarette beetle larvae resistant to hydrocyanic acid gas.--As the result of preliminary laboratory experiments designed to determine the lethal dosages of hydrocyanic acid gas to larvae of the cigarette beetle, L. H. Davis and E. W. Livingstone, Richmond, Va., report that full-grown larvae of Lasioderma serricorne Fab. have a high resistance to hydrocyanic acid gas, at least during exposure at a temperature of 82° F. With a 5-ounce dosage per 1,000 cubic feet, it was necessary to expose the larvae to the gas for 7 hours at 82° in order to obtain a complete mortality, whereas with a 10-ounce dosage an exposure of only 5 hours was required to obtain a similar result.

Tolerance of bulbous iris to hot-water treatment.--C. F. Doucette and Ralph Schopp, Sumner, Wash., continuing experiments on the control of the Narcissus bulb fly (Merodon equestris Fab.) by means of hot-water treatment, report the following conclusions as regards the tolerance of bulbous iris to this method of control: "The tolerance of bulbous iris, variety Wedgewood, for late August hot-water treatment at 111° F. for 1 hour is only fair, and at longer durations ($1\frac{1}{2}$ and 2 hours) is decidedly poor. In some bulbs a quiescent condition is induced, resulting in failure to make leaf growth but with bulb reproduction progressing on the stored food of the planted bulbs, the bulb being much reduced in size, as compared with the original. The principal effect of the hot-water treatment on iris bulbs appears to be the induction of quiescence. This condition is more pronounced as the duration of the treatment is increased. If the bulb grows normally it shows no particular detrimental effect."

INSECTS AFFECTING MAN AND ANIMALS

Mosquito-control project established.--On December 18 a local W. P. A. mosquito-control project was approved for Multnomah County, Oreg. H. H. Stage, of this Bureau, who is stationed at Portland, is assisting the management in an advisory capacity. The project is divided into three parts and is set up for a period of 12 months. The divisions are as follows: (1) 215 laborers with foremen, timekeeper, etc. for brush cutting, clearing, ditching, and diking of mosquito-producing areas; (2) 25 laborers and 5 student entomologists to carry on direct control measures by means of oil during April, May, and June; and (3) an engineering party of 6 to make a map of Multnomah County showing the extent of the mosquito-breeding grounds. This map will be of considerable benefit to future control work. The general plan and estimates for the project were drawn up by Mr. Stage.

Screw worm survey in the Southwest.--O. G. Babcock, of the Sonora, Tex., laboratory, recently made a screw worm survey of western and northern Texas, New Mexico, Arizona, and California. The following are excerpts from his report: "In general, the medicines recommended by the U. S. Bureau of Entomology and Plant Quarantine and the Texas Experiment Station, i. e., dehydrated pine tar oil sp. g. 1.065 and the benzol, were almost unknown in the Panhandle of Texas and practically all of the territory west of Fort Stockton to El Paso. The same was true in New Mexico, Arizona, and California, except at certain points where a pine-tar salesman had been. The ranchmen who had tried the pine tar oil were very well pleased with it. It was found that almost any kind of medicine was being used, generally whatever was at hand. Some of the remedies used were as follows: Chloroform, alcohol, creosotes of several kinds, generally saponified, crude pine tar, pine-tar oil, gasoline, kerosene, crude carbolic acid, coal tars, slaked lime, salt, lubricating oil, mentholatum, turpentine and lard, iodine, arsenic and zinc, ammoniated mercury, nicotine, grease, calomel, dirt, horse manure, and a solution of turpentine-phenol-egg, besides many combinations of the above chemicals. The screw worms were more severe in New Mexico in 1935 than for several years past. The 4 years' drought was broken a month later than the period for normal fall rains. The greatest damage occurred at the lower altitudes in the southern and central parts of the State. A few localities reported screw worms present for the first time."

FOREIGN PARASITE INTRODUCTION

Parasite shipments to Hawaii.--One shipment consisting of two species of Braconidae was forwarded in December from West Africa by R. H. Van Zwaluwenburg. Several consignments have also been sent from Brazil by D. T. Fullaway, these comprising one larval parasite and a staphylinid predator of fruit fly larvae, two Encyrtidae parasites of the pineapple mealybug, and two coccinellid predators of the coconut scale.

Parasite shipments to Puerto Rico.--S. M. Dohanian has now completed the collection and rearing of the Amazon fly (Metagonistylum minense Towns.) in British Guiana. A total of 6,575 adult flies were shipped by air express to Puerto Rico during November and December. Approximately 90 percent of these arrived alive at destination. Small numbers of Stomatodexia diadema Wied. and Bassus stigmaterus Cress., were also forwarded.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Living and dead larvae of the Mediterranean fruit fly (Ceratitis capitata Wied.) were intercepted at New York on October 31, 1935, in fruits of apple, persimmon, and pomegranate in baggage from Italy. Other records of this fruit fly arriving at New York in baggage from Italy on the same date are as follows: Two living pupae on the calyx end of a pomegranate, one living larva in a box containing various fruits, and one living pupa on a wrapper around a pomegranate. A living larva of the European corn borer (Pyrausta nubilalis Hbn.) was taken at Boston on September 30, 1935, in a pepper in stores from Spain. The scale insect Odonaspis penicillata Green arrived at Washington, D. C., on April 10, 1935, on bamboo in the express from China. Living specimens of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) were found at Philadelphia on October 23, 1935, in rutabaga in stores from England. The earwig Chelisoches morio (Fabr.) was intercepted at Honolulu, Hawaii, on September 3, 1935, under the bract of a coconut in cargo from American Samoa. This species has been introduced into California and is recorded on peach trees near Menlo Park. The coccid Leucaspis loewi Colvee arrived at Seattle, Wash., on May 20, 1935, on pine leaves in the mail from Sweden. This species has also been called Leucaspis sulcii Newst. A living specimen of the lycaenid Lampides baetica L. was intercepted at San Francisco on November 11, 1935, on mauna loa leis (Dioclea violacea) in express cargo from Hawaii. A living larva of the cerambycid Acanthocinus aedilis L. was found at New Orleans on November 11, 1935, in pine dunnage in ship's cargo from Belgium. A living adult of the chrysomelid Pseudomesomphalia illustris (Chev.) was taken at Mobile, Ala., on a banana in cargo from Guatemala. A living adult of the banana root borer (Cosmopolites sordidus Germ.) was found on June 27, 1935, in a plantain root in the field at Mayaguez, P. R. A living pupa of the pink bollworm (Pectinophora gossypiella Saund.) was taken at Norfolk, Va., on September 2, 1935, in a cotton boll in quarters from St. Thomas, American Virgin Islands. Living larvae of the elaterid Agriotes obscurus L. were intercepted as follows: At New York on September 16, 1935, in horseradish in stores from Germany; at Washington, D. C., on November 5, 1935, among the roots of Helleborus niger (Christmas rose) in cargo from the Netherlands; and at New York on November 6, 1935, on a potato tuber in stores from England. A. G. Boving reports on this wireworm as follows: "One of the most destructive European larvae to truck crop and corn crop. Not found in U. S. A., according to Leng's lists. See: Die Tierischen Schadlinge des Ackerbaues by S. Rostrup and Mathias Thomsen, 1931, pp. 140-142."

Pathological interceptions of interest.--Ascochyta sp. was intercepted on cucumber for the first time on December 9 at Mobile in cucumbers from Cuba. Our first interception of Cercospora foeniculi P. Magn., was made on December 12 at New York in fennel from Italy. Discosia artocreas (Tode) Fr. was intercepted on camellia for the first time on November 25 at San Francisco on material from Japan. Helminthosporium allii Campanile was intercepted from Brazil for the first time on December 6 at Norfolk in garlic and was intercepted again on December 28 at Mobile, same host and origin but a different vessel. Heterosporium allii Ellis and Mart. was intercepted for the first time on December 18 on leeks from Denmark at Philadelphia and for the second time on December 19 at Baltimore on leeks from Sweden. Heterosporium echinulatum (Berk.) Cke. was intercepted from France for the first time on December 30 at Baltimore, on carnations. Leptosphaeria rusci (Wallbr.) Sacc. was intercepted for the first time on December 13, at Philadelphia in Ruscus from Italy. Our first interception of Melanospora mathrolianum Mirande was made at New York on December 16 in tomatoes from Cuba. Mycosphaerella sp. was found infecting spinach leaves from Japan intercepted at Philadelphia on December 20. There was inadequate material for study. No such disease of spinach was found listed. A diseased chayote from Syria intercepted at New York on November 28 was infected with what appeared to be a new species of Phoma. Puccinia angelica (Schum.) Fckl. was intercepted the first time on December 2 at New York in anise from Italy. Puccinia cannae (Wint.) P. Henn. was intercepted at New York on cannas from Puerto Rico. Both previous interceptions were made in 1921, in material from Puerto Rico and Panama. Septoria aucubae West was intercepted at New York on an Aucuba plant from Italy. The only previous interception of this rust was on a plant of unknown origin. Septoria chrysanthemella Cav. was intercepted from Bermuda for the first time on November 25 at New York on chrysanthemums in baggage.

Inspection of clipper ships of Pan American Airways Transpacific service.--The air transport plane China Clipper, first of three new and larger transport planes to be operated by the Pan American Airways in its trans-Pacific service, arrived at San Diego from the East Coast via Mexico on November 9. An inspection of the plane in the stream a short distance off North Island revealed the presence in crews' quarters of 16 oranges of Mexican origin, which were found infested with Glover's scale and citrus melanose. Captain Musick, the pilot, brought the unconsumed portions of these fruits, together with the peelings, into port for destruction, rather than cast them overboard en route, as the plane followed closely the coast line in its flight, and he felt that it would be unsafe to throw them overboard with the danger of their floating ashore. On her first trip out to Manila and back the China Clipper arrived at the Alameda airport in San Francisco Bay on December 6, 1935, free from contraband plant material of any kind. The Philippine Clipper, a sister ship to the China Clipper, made the next scheduled trip to Manila via Honolulu, Midway, Wake, and Guam, returning to San Francisco at 1:24 p. m., on December 26, after a flight of 17 hours and 35 minutes from Honolulu. An inspection of the plane revealed the presence of several partially consumed fruits of apple, orange, papaya, and one very ripe banana. A package of merchandise belonging to a member of the crew was also found to contain prohibited rice-straw packing. Although the regulations do not prohibit contraband fruits, etc., from being taken aboard these planes in Hawaii, it is a violation of Quarantine No. 13 to bring such material into the territorial limits of the mainland. To prevent recurrences of this kind the company is sending out instructions to all airport and operating personnel, forbidding any fruit or other prohibited plant material from being placed aboard their planes in Hawaii or the other ports of call. Air-express service was inaugurated with the second voyage of the China Clipper. Passenger service will be inaugurated some time in April.

DOMESTIC PLANT QUARANTINES

Citrus canker discovered in Jefferson County, Tex.--Another center of citrus canker infection was recently brought to light in Jefferson County near Beaumont, Tex. Canker had not been found in that county for 16 years. Approximately 525 infected trees on six properties were discovered by inspectors working cooperatively with the State. The properties cover but a small area, however, and there are no citrus nurseries in the vicinity. The infected trees were promptly destroyed by relief workers and all properties in this general area were then given a close inspection with negative results. Inspection is carried on in eight counties in the Galveston-Houston-Beaumont area, and relief workers are eradicating worthless citrus trees. In the 4-month period ending December 21, over a million such trees had been removed from five of these counties. All citrus trees are being removed from over 98 percent of the properties on which these trees are known to exist.

Results of season's inspection for phony peach disease.--Four lines of activity were pursued in the control program in the field season of 1935: (1) Intensive inspection and eradication of all diseased trees in the environs of commercial nurseries throughout the infected area; (2) a survey, as comprehensive as funds would permit, beyond the limits of known infection for the purpose of locating and eradicating any undiscovered outlying infections, and an attempt, through State cooperation, to effect eradication of such infections; (3) intensive inspection and eradication in the lightly infected States; and (4) continuing, insofar as practicable, intensive inspection and eradication of diseased trees in the commercial belt of the generally infected area of the Southeast. The above outline has been followed to the extent that the most complete survey of recent years in the States of Delaware, New Jersey, Maryland, Virginia, West Virginia, Kentucky, and Indiana (none of which were known to be infected) was accomplished this season. This survey resulted in finding infected orchards in two counties in Maryland and five counties in Kentucky. A comprehensive survey was also made of the lightly infected States of Missouri, Illinois, Arkansas, Tennessee, North Carolina, and South Carolina, and in the commercial areas of the generally infected States of Texas, Louisiana, Mississippi, Alabama, and Georgia. The phony peach disease was found on less than 1 percent of the 9 million trees inspected in the 13 known infected States. Comparison with former years shows a marked decrease in the number of trees found infected in the generally infected area, and results point distinctly toward the practicability of control. The work of 1935 also included the inspection in 12 States of zones surrounding 113 commercial peach nurseries, 26 of which were found to be exposed to infection.

W. P. A. project on control of phony peach disease is one-third completed.--Worthless peach trees destroyed by W. P. A. workers for control of the phony peach disease in 11 infected States from early in August to the close of the year reached 6½ million. The escaped peach trees outnumbered the abandoned orchard trees two to one. It is roughly estimated that the project is one-third completed.

Pennsylvania establishes white pine blister rust control areas.--Under an order of the Department of Forests and Waters, which became effective January 15, the greater part of Pennsylvania, embracing 44 counties, has been declared a white pine blister-rust control area, within which no currant or gooseberry plants may be planted or maintained. A second area consisting of zones surrounding a nursery in Erie County was also established by this order.

Foreign visitor witnesses inspection of shipments in transit.--Leonard S. McLaine, Chief of the Division of Foreign Pests Suppression, Entomological Branch of the Canadian Department of Agriculture, while passing through Chicago on January 6, was conducted, on request, through the Post Office Terminal and witnessed the system of transferring packages by means of the conveyor belt and the manner in which shipments of plant material may be held out and inspected by Bureau inspectors, through the cooperation of the postal employees.

BEE CULTURE

Investment in bee culture in Pacific States.--F. E. Todd, in charge of the Pacific States Bee Culture Field Laboratory, Davis, Calif., reports that the investment in bee culture of the five Western States served by that laboratory has been estimated at about $6,000,000 and that the annual gross income is slightly over $1,000,000.

Pollen reserve studies.--Mr. Todd also reports that studies have been initiated on the relationship of pollen reserve in the colonies to the production of orange honey. A survey of the pollen reserves in commercial colonies showed a wide variation within each apiary. The average pollen reserve in southern California colonies was sufficient to support a queen's activity during only 4 days of bad weather, whereas those in the San Joaquin Valley were sufficient for a week. Unlike other factors affecting the wintering of colonies, such as honey stores, bee population, and shelter, it is found that beekeepers know nothing as to the pollen requirements or the pollen reserves in the colony. This work is being looked upon with great interest.

Buckeye distribution and honey plant locations.--According to Mr. Todd, surveys have been made of the buckeye distribution and possible honey-plant locations in the Sierra Nevada Mountains between Eldorado and Tulare Counties, Calif. This work is looking toward the use of these areas by beekeepers threatened with great losses from airplane dusting.

Beeswax investigations.--Mr. Todd states that 70 samples of crude beeswax have been subjected to physical tests, such as melting point, solidifying point, density, and refractive index. Chemical tests include the determination of ash, acid value, saponification value, and Hanus iodine number. The samples have also been tested for bleaching qualities by exposure to sunlight, by the use of absorbing agents, and by chemical processes.

Airplane dusting.--Spray poison by airplane dusting, Mr. Todd states, has reduced the laboratory apiary by 82 percent since July 1.

Influence of pollen reserves.--C. L. Farrar, of the Intermountain Bee Culture Field Laboratory, Laramie, Wyo., has submitted the following table contrasting two extremes in management of two good colonies. Both colonies were headed by sister queens that maintained good broodnests during the 1935 season. Colony No. 1 was wintered during 1934-35 with 700 square inches of pollen and was given a second queen on June 5, 1935. Colony No. 4 wintered during 1934-35 with only a trace of pollen (38 square inches) and was run as a normal single-queen colony.

Date of record	Colony No. 1		Colony No. 4	
	Bees	Loss or gain in honey	Bees	Loss or gain in honey
	Thousands	Pounds	Thousands	Pounds
October 6, 1934	49.0	--	40.0	--
May 29, 1935	25.8	-65.16	17.8	-57.31
June 21, 1935	32.7	16.43	7.8	- 5.85
July 3, 1935	47.4	5.80	9.0	- 2.20
July 17, 1935	64.7	62.44	7.9	4.44
July 31, 1935	84.6	91.45	18.5	9.42
August 14, 1935	100.6	157.01	32.5	58.17
August 28, 1935	105.3	155.78	40.1	58.54
September 12, 1935	96.5	65.89	43.3	26.38
Net crop	--	489.64	--	91.59

Supersedure studies.--In connection with the supersedure studies being conducted cooperatively by the Southern States Bee Culture Field Laboratory, Baton Rouge, La., and the Intermountain Bee Culture Field Laboratory, Laramie, Wyo., several hundred queens from the Southern States have been shipped to Laramie and introduced into commercial apiaries in Colorado. Observations will be made of the effect of seasonal environment on queen introduction, the determination of the length of the active productivity period prior to normal supersedure, and queens from the various commercial breeders will be compared with each other, as well as with queens produced locally by normal supersedure.

Observations on queen mating.--As a result of observations in a commercial queen-rearing apiary, E. Oertel, Baton Rouge, found that of the total queen cells produced only about half developed into commercially salable queens. The causes of this 50 percent loss have not been ascertained.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Two European species of Tropiphorus in North America.--As far as known, the weevil genus Tropiphorus has not been reported heretofore from North America. The National Museum collection now contains two species, both collected in Nova Scotia--T. tomentosus Mshm. from Truro in 1913, R. Matheson, collector; and T. obtusus Bonsd. from Yarmouth in 1933, collected by F. C. Gilliatt and submitted by W. J. Brown. The latter identification, though probably correct, is to be considered tentative. Most of the species of Tropiphorus are reported as rare or local in European literature and do not appear to be of any special economic importance.

Five species of weevils from Peruvian potatoes.--In some material recently received from J. Wille, Lima, Peru, were a number of weevils taken from potato tubers. L. L. Buchanan has recognized five species in the lot, namely, Premnotrypes solani Pierce, Trypopremnon latithorax Pierce, and three apparently undescribed species (two of Premnotrypes and one of Trypopremnon). Both P. solani and T. latithorax were described in 1914 from specimens reared in Washington, D. C., from Peruvian potatoes, but until this year no additional specimens of either species have been received at the Museum. The material now available for study indicates that Premnotrypes and Trypopremnon can hardly be maintained as distinct genera.

A new American parasite of the oriental fruit moth.--Two specimens of a species of Tachinidae reared from Grapholitha molesta Busck by R. B. Neiswander, of the Ohio Agricultural Experiment Station, have been identified by D. G. Hall as Admontia degeeriodes Coq. This appears to be the first record of this host-parasite association.

A new hymenopterous parasite of Fuller's rose beetle.--Two specimens reported as having been reared from Fuller's rose beetle (Pantomorus godmani Crotch) and received from Kenneth J. Hayward, Entomologist of the Experiment Station of Concordia, Entre Rios, Argentina, have been identified by C. F. W. Muesebeck as an apparently new species of the braconid genus

Microctonus. Although no information concerning the stage of the parasitized host accompanied the specimens, in all probability the parasite attacks the adult beetle, as this is the habit of all species of this genus and closely related genera for which there are records of behavior and biology. Species of Microctonus are known to parasitize adults of Curculionidae, Carabidae, Chrysomelidae, and Tenebrionidae, but the individual species appear to be closely restricted in their host associations.

Dialeurodes chittendeni Laing from wild rhododendron in Tennessee.--The aleyrodid Dialeurodes chittendeni Laing was originally described from England in 1928. In 1930, and each year since then, it has been intercepted in the course of quarantine inspections, the source of the material in all cases being England. The first report of the occurrence of the species in the United States was based on the finding of specimens at Kennett Square, Pa., in 1932. It was next reported from Seattle, Wash., in 1933, and the following year large numbers of specimens were sent to the Insect Identification Division from Seattle, Takoma, and Medina, Wash., where it was said to be well established on cultivated rhododendron. Specimens were also received the same year from Oyster Bay and Sunken Meadow, Long Island. In October 1935, a single specimen, later identified by P. W. Mason, was intercepted in California on rhododendron sent from Johnson City, Tenn., and since then W. R. Wood, of the Division of Foreign Plant Quarantines, collected a considerable number of individuals on wild rhododendron at Unicoi, Tenn. These specimens were also identified by P. W. Mason.

Another European record for San Jose scale.--Specimens of a scale insect from some unspecified country in the Balkan peninsula, obtained at the District of Columbia Inspection House from Prunus laurocerasus, have been identified by Harold Morrison as Aspidiotus perniciosus Comst. This is an addition to some half dozen records of the occurrence of this coccid in Europe, and its reshipment to this country seems to indicate the probability of rather rapid dissemination throughout that continent in much the same manner it has followed in the United States.

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NEWS LETTER

FOR JANUARY 1936

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FRUIT INSECT INVESTIGATIONS

The relation between temperature, sunlight, and sunlight with ultra violet partly eliminated, and the decomposition of derris.--R. D. Chisholm, of the Moorestown, N. J., laboratory, reports that three derris combinations were exposed to the sunlight in a greenhouse, southern exposure, at a temperature of 70-75° F.; three were exposed on the sunrack in the open; and three were exposed in the dark at 70° and duplicates at 37°. Fans maintained a circulation of air. The most complete decomposition took place in the greenhouse, in spite of the fact that the plates were behind ordinary glass. During the period of exposure there were only 2 days of bright sunlight. The derris deposits on the plates in the sunrack showed less decomposition. During the period of exposure low temperatures existed. The sunlight was the same as for the greenhouse exposure. The metal sunrack cover was over the plates except when the sun was shining. Therefore the actual sunshine for the plates in the greenhouse and on the sunrack was equal, although the greenhouse plates were in ordinary daylight much longer. The other difference was temperature. The derris deposits on the plates in the dark showed no appreciable decomposition either at 70° or 37°. From these observations it would seem that light is the principal factor in the decomposition of derris and that the higher the temperature the more rapid the decomposition will be.

Permanence of turf treatments in protecting grass from injury by Japanese beetle larvae.--W. E. Fleming and F. E. Baker, Moorestown, reporting on results of turf treatments on the campus of Swarthmore College, Swarthmore, Pa., state that in the spring of 1931, 17 plots of approximately 1 acre each were laid out on the College campus, which was heavily infested with Japanese beetle larvae, for the purpose of conducting experiments with lead arsenate. Two of the plots were left untreated. The remaining plots were treated with lead arsenate in combination with five different carriers, using the lead arsenate at the rate of 5 pounds to 1,000 square feet. In October 1931 two-thirds of each plot were retreated, and in May 1932 one-third of each plot was retreated. Thus, when the applications were completed in May 1932, the lead arsenate had been applied at the rates of 5, 10, and 15 pounds per 1,000 square feet. The data obtained from the surveys of the different plots show that an application of lead arsenate at the rate of 5 pounds to 1,000 square feet will not reduce the density of the larval population in turf for a period longer than 2 years, while the applications at the rate of 10 or 15 pounds per 1,000 square feet still maintain a practically complete elimination of larval population approximately 4 years after the initial treatment. It is apparent that not less than 10 pounds of lead arsenate is required per 1,000 square feet of established turf to assure protection of the grass from larval injury for a period of years. It was also found that the lead arsenate was equally effective whether applied as a spray or mixed with sand, tankage and sand, or activated sludge and sand. The addition of a complete fertilizer containing acid phosphate, ammonium sulphate, and muriate of potash, or the addition of greensand marl to the lead arsenate destroyed the insecticidal value of the lighter applications and decreased the effectiveness of the heavier applications.

Cross-breeding parasites of the Japanese beetle.--T. R. Gardner, Moorestown, reports that during the fall of 1934 propagation work was carried on with crosses of the Korean strain and Japanese form of *Tiphia popilliavora* Roh. to determine the time of progeny emergence of these two strains. Propagation work was carried on with both the Korean strain and Japanese form for comparison. The host grubs used, which were in the third stage, were parasitized at approximately the same time in the fall of 1934, and the resulting *Tiphia* cocoons were all stored in the same temperature-controlled chamber throughout the hibernation and development period. The emergence of this material in 1935 was as follows:

Cross	Period of grub parasitization in 1934	Period of emergence in 1935
K female X K male	Sept. 13 - Nov. 6	Aug. 19 - Sept. 16
K female X J male	Sept. 16 - Oct. 30	Aug. 20 - Sept. 9
J female X J male	Sept. 15 - Oct. 30	Aug. 1 - Aug. 26
J female X K male	Sept. 12 - Oct. 25	Aug. 5 - Sept. 14

The table shows that the progeny of the Korean female crossed with the Japanese male emerges at approximately the same time as the Korean strain and 2 weeks later than the progeny of the Japanese female crossed with the Korean male. This would indicate that the F-1 generation emergence period of crosses between the Korean strain and Japanese form is determined by the parent female in both cases.

The effect of temperature upon the fungus *Metarrhizium anisopliae*.--In connection with studies of diseases affecting Japanese beetle larvae, S. R. Dutky, Moorestown, inoculated healthy third-instar larvae of the Japanese beetle with the fungus *Metarrhizium anisopliae* by dusting the larvae with spores of the fungus. The larvae were then placed in tightly stoppered glass vials and held at various constant temperatures, while undusted larvae held in vials at the same temperatures served as controls. Ten inoculated and ten untreated larvae were used for each temperature. The results of this test indicate that the temperature of holding has a definite effect upon the time of development of the disease, 50° F. being very nearly the minimum temperature at which parasitism by *Metarrhizium anisopliae* occurs.

Experiments with Trichogramma give negative results for codling moth control.--For several years the Division of Fruit Insects has been carrying on experiments to determine the practical value of the utilization of the egg parasite *Trichogramma* in the control of the codling moth (*Carpocapsa pomonella* L.). Experiments have been carried on at Cornelia, Ga., under the direction of Herbert Spencer, of the Albany, Ga., station, in cooperation with the Georgia State Entomologist's Office, with C. H. Alden of that agency in immediate charge. Experiments have been carried on also at Yakima, Wash., by E. J. Newcomer and M. A. Yothers. The parasites for the experiments were reared at the Albany, Ga., station. The experiments at Cornelia during the season of 1935 included 15 pairs of orchard plats, each colonized plat being compared with a similar one in the same orchard, but some distance from it. The average parasitization of codling moth eggs in the colonized plats was 42.9 percent and, for the uncolonized it was 31.1 percent. The percentage of clean fruit for the entire season averaged 48.9 for the colonized plats and 41.1 in the uncolonized plats. The differences, however, were not very consistent, ranging from 43.6 (arithmetical difference) in the positive direction to 27.5 in the opposite direction. The results at Yakima in the season of 1935 were quite similar, the infestation records showing an average of 69.6 percent of clean fruit for 9 colonized plats as against 60.8 percent for the check plats. Here again, however, the differences varied from 40.9 in favor of the parasite liberations to 18.4 in the negative direction. The results of neither of these experiments appear to be statistically significant, and differences of this size are not sufficient to offer a great deal of encouragement. A decision has therefore been reached to discontinue the work with the use of *Trichogramma* for codling moth control.

Tobacco shade cloth effective in the protection of drying pears from insect attack.--By comparing infestation in pears unprotected during drying with fruit covered with tobacco shade cloth during and for 5 days after drying on stacked trays, Heber C. Donohoe, of the Dried Fruit Insect Laboratory at Fresno, Calif., demonstrated marked advantage in the use of the cloth. The infestation was chiefly by the raisin moth, *Ephestia figulilella* Greg.; some larvae of the dried fruit moth, *Vitula serratilineella* Rag., were present. Covered pears averaged 1.8 percent infested, whereas 19.0 percent of the unprotected halves contained infestation. Previous tests of shade cloth protection of drying peaches, nectarines, apricots, figs, and raisins against the raisin moth have been successful.

MEXICAN FRUIT FLY CONTROL

Fruit flies continue to increase.--In the valley area all species of fruit flies found there previously were trapped in increased numbers during January. The total for this month over December for *Anastrepha ludens* jumped from 8 to 49; *A. serpentina*, 43 to 76; *A. fraterculus*, 9 to 15; *A.* sp. "Y", 7 to 30; *A. pallens*, 489 to 580; and *Toxotrypana curvicauda*, from 11 to 26. There were also trapped 2 specimens which were listed as probable new species. No larval infestations were found throughout the month. Fruit shipments for the season total 5,503 equivalent carloads to the end of January.

DATE SCALE CONTROL

Progress of work during January.--In January inspection was completed in the Coachella Valley, the principal date-growing area in the Southwest. No Parlatoria date scale has been found in the valley since November 1931. A final scouting of the valley to discover any unlisted palms was begun during the month and all previously infested properties are being checked for volunteer palms. In the Imperial Valley inspection was continued, and a number of small plantings were given their final inspection.

CEREAL AND FORAGE INSECT INVESTIGATIONS

White grubs develop rapidly under laboratory conditions.--T. R. Chamberlin, Lee Seaton, and Paul Kitcher, Madison, Wis., report that larvae of Phyllophaga spp. reared in the laboratory from eggs laid last July and August by beetles of identified species, together with larvae of the same age collected in the field, were reexamined during the month. Of 91 larvae hatched in the laboratory, 17 had changed from the second to the third, and 1 larva from the first to the second instar between the 1st and 21st of the month. Of 498 larvae collected in the field, 218 had changed from second to third instar between early in December and January 21. This rapid development under laboratory conditions is interesting because, with few exceptions, these larvae belong to species characterized in the locality of Madison, Wis., by a 3-year cycle, and species whose larvae in the field are now in the second instar.

Recirculation of gas in fumigation under vacuum increases efficiency in insect control.--R. T. Cotton, Manhattan, Kans., reports that experimental work on vacuum fumigation conducted at Cedar Rapids, Iowa, for the control of insects in stored cereals, revealed the interesting fact that uniform distribution of a fumigant is not obtained in a vacuum tank by the customary procedure. Instantaneous adsorption of the fumigant by the commodity on the outside of the load prevents the full concentration from reaching the interior of the load. It has been found that by using multiple gas entry points to the tank and by recirculating the fumigant, after its entry, with the aid of the vacuum pump and a by-pass system, the effective dosage can be reduced 25 percent. This represents a considerable saving in the cost of fumigation.

A dermestid beetle injuring seeds.--Mr. Cotton reports also that, although dermestid beetles have been generally considered to be chiefly feeders on animal products, it has been found that Trogoderma sp., probably versicolor Creutz., is one of the worst pests of stored seeds at Manhattan. This species was also found in a local tire repair shop breeding in large numbers in the compound used for vulcanizing damaged tires.

Second fall generation of hessian flies in 1935.--E. T. Jones, of Manhattan, states that an early November survey has indicated that a moderate, though potentially important, infestation in southeastern Kansas and southwestern Missouri has developed from second-brood hessian flies over an area where infestation by the first brood was comparatively light. The larvae, indicated in the following summary, were from one half to full grown and subsequently developed into second-generation puparia.

Area	Average plants infested	Average tillers infested	Average total forms in 100 plants	Average total forms larvae
	Percent	Percent	Number	Percent
Southeastern Kansas-------	31	20	83	53
Southwestern Missouri----	29	13	75	66

F_4 selections of Marquillo x winter wheat hybrids show outstanding resistance to heavy infestations of hessian fly.--C. M. Packard, La Fayette, Ind., reports that in resistance tests at Springfield, Mo., out of 263 F_4 winter habit strains, from hybrids, involving a selection of Marquillo as resistant parent and Oro, Minturki, Tenmarq, and Kawvale as desirable winter parents, 20 strains with plant infestations ranging from 0 to 60 percent have shown comparatively high resistance and tolerance to heavy fall infestations of hessian fly. Of the entire group, 147 strains had a range of infestation of from 61 to 90 percent and were decidedly more resistant than their winter wheat parental checks. In the remaining 96 strains, a higher degree of tolerance was indicated than was shown by their parental strains, namely, Oro, Minturki, Tenmarq, and Kawvale. The range of infestation in the F_4 strains was 91 to 100 percent and that of their parental strains was from 97 to 100 percent.

An ortalid fly pest of green corn found in Puerto Rico.--F. M. Vandenberg, of the Mayaguez, P. R., laboratory, reports that in the investigations of the insects affecting corn recently undertaken in Puerto Rico, the work of a dipterous maggot was observed in ears of green corn grown for roasting purposes. This maggot has been identified as the young of a fly, *Euxesta stigmatias* Loew, belonging to the family Ortalidae of the Diptera. A closely allied species in this country is well known as a scavenger. The Puerto Rican species, however, has been reared on fresh green corn from egg to adult. Although the known distribution of this fly indicates a more or less tropical habitat, it is believed that it might become of economic importance should it gain a foothold in the Gulf States.

JAPANESE BEETLE CONTROL

Hunch results in discovery of irregular shipment.--When a Brooklyn, N. Y., greenhouse establishment, after having been refused Japanese beetle certification for 44 large palms from an uncertified greenhouse, made no further attempt to obtain certified stock to fill this valued order from Miami, Fla., H. L. Smith, district supervisor, became suspicious. Upon visiting the piers in New York City on January 11, Mr. Smith found such a consignment of palms destined to Miami under the tags of one of the New York City plant brokers. An immediate investigation disclosed that the greenhousemen had arranged with a class I broker who had a supply of certificates to turn the shipment over to the broker so that it might be shipped in the latter's name and under their certificate. Since the plants had been placed aboard ship and could not be unloaded without delaying the vessel's departure, arrangements were made for the plants to be brought back on the return trip. The certification privileges of the shipper were immediately withdrawn and papers were filed with the United States Attorney in New York City on January 24 alleging that the broker had violated the Plant Quarantine Act.

Illinois will treat Japanese beetle infestation.--Advices have been received from L. A. Moore, Superintendent of the Division of Plant Industry, Illinois State Department of Agriculture, that Illinois will follow recommendations of the Bureau as to soil treatment in the infested areas in Chicago. An attempt will be made by the State to put this through as a W. P. A. project, with possible assistance from the Chicago Park Board.

Dismantled colonial house inspected.--Inspection was made by the district inspector at Framingham, Mass., of an old colonial house at Henry Ford's Inn property at Sudsbury. The entire dismantled frame of hand-hewn oak and the doors and windows were loaded into a freight car for shipment to the Ford village at Dearborn, Mich. Inspection was also made of old bricks that had been taken from the fireplace and piled in the yard.

Decrease in Christmas-tree inspections.--Final tabulation of the records of 1935 Christmas-tree inspection indicates that 590,105 trees originating in the lightly infested gypsy moth regulated area were examined and certified for shipment to nonregulated points. This represents a 34-percent decrease in the number of trees inspected in the same area during the 1934 inspection season, when 905,004 trees were inspected and certified.

Current Dutch elm disease activities.--Accomplishments in Dutch elm disease eradication activities for the month of January included the removal of 92 confirmed trees and 119,550 dead and dying trees. During the month 86 elms were confirmed as diseased and 87,304 dead and dying trees were tagged for later removal by sanitation crews. The grand total of trees of all types removed is now 1,155,666. At the end of the month there were in the field 2,321 W. P. A. men, 56 appointees, 7 per diem workers, 1,154 C. C. C. enrollees, and 43 State employees. Only 3 confirmed trees remained standing at the end of the month.

New Jersey infected zone extended.--Confirmation was received covering a 12-inch elm located in White Township, Warren County, N. J. This confirmation was the result of investigations carried on by the Morristown, N. J., laboratory in conjunction with scouts furnished from the New Jersey eradication force. The diseased specimen was found among samples collected in a swamp along the Pequest River. This new infection increases the New Jersey infected zone by 44.78 square miles, and extends the protective zone farther into Pennsylvania. The New Jersey infected zone now includes 2,529 square miles, and the protective zone measures 1,091 square miles.

Additional diseased elms discovered in Cleveland.--Recent confirmation of 16 diseased elms in Cleveland, Ohio, extended the infected zone in that section about 1 mile into Lake County. In view of the finding of the large number of confirmed trees and the fact that the infection is localized, the sanitation program there was broadened to include as much of the dead and devitalized material as possible, since it is in such material that the disease seems to exist. At the end of January there were only 2 standing confirmed trees in the Cleveland infected zone.

W. P. A. quotas unfilled.--Of 175 men requisitioned during December in New York State, only 53 men reported for work. The relief rolls prior to November 1 in upper Westchester, Rockland, and Orange Counties have been exhausted. Putnam County has furnished 31 of 50 laborers requested, with the possibility that the quota will eventually be filled.

Eight-hour day for Dutch elm disease crews.--Beginning January 2, W. P. A. workers engaged in Dutch elm disease eradication and sanitation went on an 8-hour day basis, replacing the 6½-hour day. The men continued on the 5-day week, but work only 16 days a month for a total of 128 hours. This will permit more work per day with less travel and closer supervision.

FOREST INSECT INVESTIGATIONS

Bark beetles not a serious factor in thinning of young-growth pine stands in California.--Many of the overcrowded stands of second-growth pine in California were thinned by the Forest Service as a part of the N. I. R. A. relief program in 1934. The bark-beetle infestations developing in the slash created by these thinnings were considered a possible threat to reserve trees left after cutting, and the Berkeley field laboratory was requested to study this aspect of the operation. K. A. Salman, Berkeley, has recently completed the final report which summarizes conditions found on the thinning areas during 1934 and 1935. Most of the slash was attacked by bark beetles, except the very small trees below the diameter susceptible to attack. For the most part, broods resulting from these attacks were not very successful. Such losses as did occur in standing trees appeared to result from attraction of beetles to the areas soon after the thinning took place and not from beetles that bred in and emerged from the slash. So far as the results of the 1934 thinning operations can be interpreted, the hazard from bark beetles to reserve trees is negligible in stands of reproduction and small poles. Some hazard does appear to be created where large poles and small trees are cut, particularly where these are cut among groups of trees of similar or larger dimensions. It is conceivable, however, that similar work carried on under different climatic or stand conditions might result in outbreaks that would have a serious effect on the reserve stand.

Cold hardiness of mountain pine beetle increases in fall and winter.--J. M. Miller, of the Berkeley laboratory, reports that experiments to determine resistance to low winter temperatures by the mountain pine beetle during the fall of 1935 have shown that hardiness increases with the advance of cold weather. The material used as a basis for these experiments was concentrated in infested logs at a point in the Sierra Nevada Mountains near Wawona, Calif., where the broods were allowed to go into the overwintering stage under the natural conditions of forest environment. Three important host trees, sugar pine, lodgepole pine, and ponderosa pine, were represented in this material. At intervals during the fall and winter, sample logs were transported to the Berkeley laboratory, where immediate tests were made for cold hardiness of the broods. Resistance of larvae was found to be consistently lower in sugar pine than in ponderosa and lodgepole pine. An increase in cold hardiness was evident as the overwintering condition of the broods became established. This is best illustrated by the material from lodgepole pine. The first sample was tested on October 15, while the larvae were still in the active feeding stage. At that time a temperature of 7° F. was sufficiently low to kill 100 percent of the larvae. Two months later, on December 11, all larvae were not killed until a temperature of $-2\frac{1}{2}°$ had been reached. On January 12 samples of the same material brought in from the field required a temperature of $-12\frac{1}{2}°$ to cause complete mortality. This same increase of cold resistance was produced in the laboratory by long exposure of the larvae to temperatures just above the freezing point. Material brought in from the field on October 15 and kept in cold storage at 36° for 7 weeks increased in resistance from a killing point of $7\frac{1}{2}°$ to $-5°$. This is similar to the increased resistance built up in the field during the same time interval.

Black Hills beetle outbreak successfully controlled.--J. A. Beal, of the Fort Collins, Colo., laboratory, reports that the heavy and widespread infestation of the Black Hills beetle, which has increased to epidemic proportions during the past 3 or 4 years in the ponderosa pine stands of the Uncompahgre and Montezuma National Forests in southern Colorado, has been brought under control by the aggressive campaign of the Forest Service, using C. C. C. labor. The entire Uncompahgre forest was covered by control work during 1933 and 1934 and much of it was recleaned during 1935. A reduction of 95 percent in the number of infested trees has been obtained on this forest. At present the entire Montezuma forest has been covered during control operations. Light infestations on one unit where recleaning has been done indicated that here too control had been very successful, showing a 95-percent reduction in the number of infested trees. In some units the number of infested trees has decreased from an average of 90 per section to as low as 4 or 5 per section this year.

Termites damage southern shelterbelt nurseries.--Dr. Beal also reports that termites of the species Reticulitermes tibialis Bks. have done a great deal of damage during the past summer to nurseries in Oklahoma and Texas. This damage was peculiar in that it was not associated with buried wood or seedbed frames, but occurred on the roots of seedling hardwood trees, in cultivated rows, often where the soil appeared to be almost free from rotting vegetation. Damage has been most severe to green ash, mulberry, hackberry, and honey locust seedlings, although almost no species showed immunity. In some nurseries it is estimated that losses during the growing season ran as high as 25 percent. Preliminary experiments on control of termites in nurseries indicated that paradichlorobenzene crystals at the rate of 3½ pounds per 100 square feet of soil, worked into the soil from 2 to 3 inches, successfully controlled the termites.

Laboratory work on European spruce sawfly continues.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports that European spruce sawfly larvae, reared during December on a caged tree in the laboratory, spun cocoons from January 6 to 16. Adults emerged in January, the last ones issuing on the 29th. No oviposition has been observed.

Notes on forest-insect parasite work in New England.--P. B. Dowden, of the New Haven, Conn., laboratory, reports that, as in 1934, parasitization of the imported willow leaf beetle (*Plagiodera versicolora* Laich.) by *Schizonotus sieboldi* Ratz. remained high. It ranged from 15 to 80 percent. Mr. Dowden also reports that about 8,000 larch sawfly cocoons from Montana and points in Michigan and Wisconsin were isolated for parasite emergence and that on January 6 a shipment of 52,000 adults of the elm leaf beetle was received from H. L. Parker, Hyeres, France. It is hoped that the tachinid parasite *Anachaetopsis nitidula* Rond. will be obtained from this material next spring.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Moth control personnel.--Up to January 15, under the W. P. A. projects, the following number of workers were employed under gypsy moth projects in the different States, as follows: Maine, 178; New Hampshire, 95; Vermont, 559; Massachusetts, 612; Rhode Island, 68; Connecticut, 632; New York, 169; New Jersey, 71; and Pennsylvania, 908; total, 3,292. On the same date, under the W. P. A. emergency project, the number employed on brown-tail moth work was as follows: Maine, 397; New Hampshire, 473; Massachusetts, 527; Rhode Island, 7; Connecticut, 16; total, 1,420. During the first week in January an average of 2,006 men from C. C. C. camps were employed on gypsy moth work in the area east of the barrier zone. They were assigned as follows: New Hampshire, 114; Vermont, 619; Massachusetts, 682; Connecticut, 591. The last week in December it was understood that one C. C. C. camp in Connecticut was to be abandoned. This was strictly a gypsy moth camp. The State Forester of Connecticut has arranged for the transfer of several gypsy moth foremen, in order to improve the gypsy moth organization in the Connecticut camps. In Massachusetts it was understood that four camps would be abandoned, in which gypsy moth work has been supervised from this office, three of these being Department of Interior camps, and the other a Forest camp. It appears that in New Hampshire no camps will be abandoned, and it is understood that in Vermont only one camp, which effects gypsy moth work, would be discontinued. Unfortunately, this is the camp at Bellows Falls, which is the most important from a gypsy moth standpoint of any of the camps east of the zone in Vermont. In Massachusetts the Commissioner of Conservation has designated the State district man, in the western part of the State, as State inspector of the four purely gypsy moth camps in Massachusetts. It is felt that this will be helpful to the project, as this official is thoroughly familiar with the gypsy moth work and has always cooperated with this office. Under the brown-tail moth project in Maine most of the time is now being spent in scouting the towns carefully and cutting all of the brown-tail winter webs, and some cutting of worthless apple and wild-cherry trees is being done. In New Hampshire all time is being spent in cutting winter webs. In Massachusetts both cutting out of worthless favored food plants and cutting of winter webs is being done. In Rhode Island all time has been spent in cutting of worthless favored foods, but this is to be discontinued and the time will be used in scouting for winter webs. In Connecticut all time has been spent in scouting for winter webs. The numbers of brown-tail webs cut up to the middle of January were as follows: Maine, 264,377; New Hampshire, 386,243; Massachusetts, 294,055. The numbers of trees cut--these being mostly large wild cherry and old apple trees--were as follows: Maine, 32,964; New Hampshire, 36,438; Massachusetts, 139,160; and Rhode Island, 574.

PLANT DISEASE CONTROL

Ribes-eradication work in sugar pine region, summary for 1935.--Over 15,000,000 Ribes bushes were destroyed in 1935 in the sugar pine States (California and Oregon) in connection with the blister rust control project in that region. Of this number 12,564,532 bushes were eradicated in California on 74,194 acres with 43,821 man-days of labor, while in Oregon 2,448,659 bushes were destroyed on 18,915 acres with 9,572 man-days of labor. This work included both initial eradication and reeradication, 85,158 acres being initially worked and 7,951 acres reworked.

Pine infections in the Inland Empire.--The number of known locations of centers of pine infection in the Inland Empire as of December 1935 totaled 208, an increase of 79 over the number known at the end of 1934. Of this total, 15 are centers that originated in 1923. No new centers of this age were found in 1935.

Blister rust control activities in the North Central States.--Approximately 500 W. P. A. laborers were used in December on blister rust control work in the North Central States, most of these being engaged on preeradication survey work. A limited amount of local Ribes-eradication work was performed in Michigan, 49,617 bushes being destroyed on 3,713 acres with 643 man-days of labor. The eradication of the European or cultivated black currants had to be curtailed where the depth of the frost in the ground prevented their removal and the deep snow in some of the northern counties made it impossible to locate the plants. During the month 113,063 inspections were made for cultivated black currants and 5,850 bushes were destroyed. A blister rust canker on white pine was found in Benzie County, Mich., the first finding of blister rust on white pine in that county.

New blister rust infection areas located in New York.--District leader Nichols of Essex County, N. Y., reports that during the early part of January several badly infected white pine areas were discovered by W. P. A. employees engaged in preeradication-survey work. These infection areas are located on the slopes of Jug, Little Far, and Old Far Mountains in North Hudson Township. Heavy infection and severe damage was noted on pines of all sizes, including many large trees.

Supervisory positions transferred to Civil Service.--During the past 6 months the regular administrative positions in the field service of the white pine blister rust control and barberry eradication projects have largely been placed under the competitive Civil Service. Formerly most of the personnel on these cooperative projects had been appointed as agents and, as such, were not entitled to the benefits of the Retirement Act. Civil Service registers for the positions of Pathologist, Associate Pathologist, Assistant Pathologist, and Chief Scientific Aid were established as the result of Civil Service examinations held in April 1935, and since this date 59 agent positions in the field service on the blister rust control project and 16 on barberry eradication have been placed under Civil Service. Registers are also available from which temporary appointments to the position of Scientific Aid can be made.

COTTON INSECT INVESTIGATIONS

Distribution of overwintering pink bollworms.--Additional information on the distribution of the overwintering larvae of the pink bollworm in the fields of the Big Bend of Texas, has been reported by A. J. Chapman, H. S. Cavitt, and M. H. Hughes, of the Presidio, Tex., laboratory. The results of the soil examinations, reported last month, showed from 1.4 to 43.6, or an average of 12.61 larvae per square yard, in the soil. The larvae hibernating above ground have now been reported on. Examination of plant material remaining on the plants and on the surface of the soil after the final picking was made in 25 fields. From 1.0 to 141.4, or an average of 42.9 larvae per square yard, were found hibernating above ground this fall. The proportion of total pink bollworms found above ground this year was 22.6 percent, as compared to 8.0 percent in 1934, 13.8 percent in 1933, and 7.7 percent in 1932. The mean temperature during September and October 1935 was several degrees lower than in 1933 and 1934 and is thought to have been a factor in the larger number of larvae hibernating in the ground this season. Following the field clean-up the remaining surface trash was again examined from 100 square yards in each of 9 fields. These examinations showed an average of 2.74 larvae per square yard in the surface trash remaining after the clean-up. The thoroughness of the clean-up was shown by a reduction of 35 to 91 percent in the surface-trash population, the only larvae that could be reached by the clean-up.

Soil insects injuring cotton in Arizona.--L. D. Christenson, Buckeye, Ariz., has summarized last season's work as follows: "During the summer of 1935, a survey of soil insects affecting irrigated cotton was undertaken in Arizona. Most of the soils characteristic of the area on which cotton is grown are loams or sandy loams. A number of insects were found to be damaging cotton roots. Early in the season a cutworm, Feltia malefida Gn., caused severe losses in the vicinity of Safford, necessitating replanting of cotton. A wireworm, Conoderus sp., damaged seedlings over widespread areas. For the most part, its attack was not sufficiently concentrated to seriously affect production, but one area was noted in which the injuries by this insect were so pronounced as to thin the stand appreciably. The burrowing bug (Pangaeus discrepans Uhl.) was present in almost all fields sampled, nymphs and adults alike feeding on cotton roots. A test indicates that their detrimental effect, in population densities noted, is of no significance so long as plants have plenty of water. Cotton plants in Arizona are abundantly supplied with water (4 to 5 acre-feet per season) as a crazy-top control measure. P. discrepans was more abundant in sandy soils than in loams and clay. A small scarabaeid, Ataenius hirsutus Horn., was exceptionally abundant in cotton fields at Sacaton. A maximum concentration of approximately 10,000,000 per acre was recorded. Field tests and cage observations showed that the adult beetles consume cotton roots. Under all circumstances, however, the adults were extremely sluggish and ate but little. Another small beetle, Psammobius sp., was very abundant over the entire area. This insect was found to be most numerous in the compact soil just below the plow line. Cage tests have shown that Psammobius sp. may consume cotton roots sparingly. A cicada, Diceroprocta apache Davis, was present in cotton-field soils everywhere. This species preferred to breed up in desert areas and grass lands, however, the population in cotton being small. The adults did some damage to cotton by ovipositing in fruit-bearing branches. Another beetle which has been reported as damaging cotton roots in the past, Blapstinus sp., was frequently encountered but no instance of severe injury was noted. The field cricket (Gryllus assimilis var. pennsylvanicus Fab.) was present in all fields. This cricket was especially abundant in the Yuma section. Smaller soil animals were present in all fields. At Sacaton their average seasonal population density was 65,400,000 per acre or 0.86 per cubic inch of soil at depths up to 12 inches. At Buckeye their average seasonal population density was 10,300,000 per acre, or .137 per cubic inch of soil, at the same depths. Several of the smaller soil animals were found in cage tests to feed upon cotton roots, making gouges and pits, or pruning off root hairs. Two collembolans, Pseudosniella violenta Fols., and an unidentified entomobryid, were responsible for much pitting. Other Collembola and a japygid were responsible for pruning root hairs. A small unidentified coleopterous larva also proved to be a root feeder. Injury to the cotton root system by all of these insects was for the most part confined to the relatively porous soil above the plow line, the tiny rootlets suffering most. Plants were not noticeably affected, appearing very vigorous at all times as a result of frequent irrigations. Symphylids, Protura, and Campodeidae were not found in cotton-field soils of Arizona. In studies made by the writer in Louisiana, Texas, California, and Arizona, this is the first locality in which these small organisms have been entirely absent."

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Field clean-up completed in the Big Bend of Texas.--The cleaning of cotton fields was completed in the Big Bend area of Texas on January 23, a total of 2,262 acres having been cleaned. The work consisted of first cutting the stalks with machetes, picking up by hand the material shattered during the cutting, and then burning all of it. Especially constructed rakes were used instead of hand-picking, and proved to be much more economical and efficient. All of the cotton in this area is grown under irrigation, water being obtained from the Rio Grande. The Conchos River flows into the Rio Grande from Mexico about 2 miles above Presidio. Approximately 90 percent of the cotton is produced below the mouth of the Conchos, owing to the water supply, and the most pink bollworms occur in this section. All of the fields in this area were cleaned, also all of the fields above the mouth of the Conchos, where the worm population would justify.

Wild cotton eradication.--The eradication of wild cotton in southern Florida has continued to go forward very satisfactorily. Larger crews than usual are being used this season, which is of particular advantage as many additional sections have been thoroughly gone over for wild cotton, whereas the smaller crews heretofore used did not have time to go over the entire area in which they were working. The larger crews are made possible by the fact that work is being carried on this year with W. P. A. funds, with the exception of the work at Cape Sable. Cape Sable is rather isolated, the laborers have to live in camp, and it was impossible to obtain enough men to carry on the work; therefore this section was dropped for the time being from the W. P. A. list and work is being carried on with Bureau funds. During the month a first clean-up was completed on approximately 348 acres, from which 38,695 mature and 6,169 seedling plants were removed. Along the west coast only 6½ acres of virgin cotton, containing less than 500 mature plants, was located in areas previously worked. The location of the remaining cotton, removed during the first clean-up, has been known for some time, but it has heretofore been impracticable to clean it. A recleaning was made on some 7,500 acres, from which only 290 mature plants, previously missed, were removed, in addition to 206,617 seedling and 7,057 sprout plants.

Thurberia plant eradication.--The work has continued to progress satisfactorily during the month and is being carried on with W. P. A. funds. All of the work so far has been in the Tortillita Mountains and will be completed by the middle of the month. It was thought that it would be finished by the end of January, but some time was lost on account of weather conditions. This range is being worked first because it is the one nearest to cultivated cotton in the Santa Cruz and Gila Valleys. When it is completed work will be begun in the Santa Catalina Mountains, as this range is next nearest to cultivated cotton. This latter range is much rougher than the Tortillitas and arrangements have been made with the local W. P. A. officials whereby laborers who are too old or who have a physical disability that will prevent them from working in rougher areas are to be transferred to other projects and replaced by younger and abler men.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tomato pinworm and potato tuber worm in tomatoes in California.--J. C. Elmore, of the Alhambra, Calif., laboratory, reports that field observations during October, November, and December 1935, have disclosed that the tomato pinworm (Gnorimoschema lycopersicella Busck) can be considered a serious pest of tomatoes only in that part of California extending from Ventura County southward, although it occurs on wild host plants in Santa Cruz and Marin Counties. The surveys also revealed that the potato tuber worm (Gnorimoschema operculella Zell.), which is associated usually with the tomato pinworm in some parts of California, occurs extensively in tomatoes in Santa Barbara and San Luis Obispo Counties, where it has been mistaken commonly for the tomato pinworm. Normal development of the pinworm at a retarded rate, including oviposition, continued throughout December and a decided increase occurred in the population of the pinworm in winter tomato fields. The precipitation was low, being 2.5 inches below normal.

Recovery of European earwig parasite in Washington.--C. W. Getzendaner, of the Puyallup, Wash., laboratory, reports that puparia or adults of the European earwig parasite Digonichaeta setipennis Fab. were recovered during 1935 in 8 widely separated localities in the State of Washington. A total of 2,236 parasite adults and puparia, plus 10,000 parasitized hosts, have been liberated in 17 colonies distributed in Washington and Idaho. A total of 125 parasites were recovered from the 8 localities involved.

Tolerance of tuberose bulbs to hot-water treatment for bulb mite and root-knot nematode control.--As the result of tests at Magnolia, N. C., with hot-water treatment against the bulb mite (Rhizoglyphus hyacinthi Boisd.) and incidentally the root-knot nematode (Heterodera marioni (Cornu)) on tuberose, C. A. Weigel and R. H. Nelson, of the Beltsville, Md., laboratory, report that dormant tuberose bulbs of planting size were not affected adversely when subjected to the hot-water treatment at temperatures of 110° F. for 1 hour, or at 118° to 120° for 1/2 hour. The results indicate also that the application of the treatments on a commercial scale is practical. The best results were obtained when the treated tuberoses were planted on either newly cleared land or on soil that had been in cultivation but on which tuberoses had not been grown the previous season, indicating that tuberoses should not be planted in succession in the same field. The bulb mite was killed by the hot-water treatment at all of the above-mentioned temperatures and durations of time, and the root-knot nematode succumbed at the two higher temperatures mentioned.

Effect of time of planting peas on pea weevil infestation.--In summarizing the results obtained from nine plantings of Alaska peas at Moscow, Idaho, made from April 11 to June 28, 1935, T. A. Brindley, of the Moscow laboratory, reports that infestation by the pea weevil in the peas harvested from these various plantings ranged from a maximum of 80.9 percent in the second planting, made on April 30, to a minimum of 11.6 percent in the peas harvested from the last planting, made on June 28. The number of peas produced decreased rapidly after the second planting and the weight of the peas decreased steadily from the first to the last planting. The data indicate that it is not profitable, in the Moscow locality at least, to delay the planting of Alaska peas in order to reduce weevil damage.

Corn earworms and cutworms on cabbage complicate control of cabbage worms.--In reporting on the results of experiments against various species of cabbage worms at Charleston, S. C., during the fall of 1935, W. J. Reid says that the corn earworm (Heliothis obsoleta Fab.) and several species of cutworms were more abundant and caused more damage to cabbage foliage than did the common species of cabbage worms usually more prevalent, i. e., the imported cabbage worm, the cabbage looper, and the larva of the diamond-back moth. The data obtained from the experiments indicated that the strengths of derris-dust mixtures or pyrethrum-dust mixtures recommended for the common species of cabbage worms were not effective in controlling the larvae of the corn earworm or the cutworms, but that dust applications of paris green, calcium arsenate, or synthetic cryolite before the plants began to head were effective against H. obsoleta and proved satisfactory when used in conjunction with a standard cutworm poisoned bait when both pests were present in destructive numbers.

Biometrical analyses improve efficiency of cabbage worm studies.--Recent studies of data obtained by W. J. Reid, Charleston, and analyzed by L. B. Reed, of the Chadbourn, N. C., laboratory, in connection with insecticide tests against 3 common species of cabbage worms in South Carolina, indicate that in any given field the number of cabbage worms present on the marketed part of the plant (the head plus four loose wrapper leaves) was proportional to the number of worms on the entire plant and to the number present on the unmarketable portion of each cabbage plant; also that the insecticides were equally as toxic to the worms on the unmarketable part as to those on the marketed part of the plant. These results are important as indicating that census determinations of the cabbage worms present only on the marketed part of cabbage afford significant data comparable to that obtained by making records of the worm population on the entire plant. The determination of these facts will make it possible for the field workers on this project to obtain significant data on the effect of insecticide treatments with a minimum expenditure of time.

Relation between soil-moisture content and wireworm mortality in Pacific Northwest.--E. W. Jones, of the Walla Walla, Wash., laboratory, reports that in the course of experimental field investigations to determine the effectiveness of soil desiccation on the survival of wireworm populations, laboratory tests have indicated that 100 percent of the Pacific coast wireworm(Pheletes californicus Lec.) present, were killed in 48 hours of exposure at 68° F. in sandy loam and in loam soils in the presence of a soil-water content ranging from 17 to 20 percent of the moisture equivalent (2.9 to 3.5 percent dry-weight basis). These tests also disclosed a significant difference in the resistance of the wireworm species P. canus and P. californicus to the drying effect of the soil, P. californicus proving to be the more drought-resistant of the two.

Susceptible host plants of cabbage webworm.--In summarizing the results of biological studies of the cabbage webworm at Chadbourn, N. C., W. A. Thomas reports that during 1935 this insect was found feeding on various types of Crucifera and on beets. The order of susceptibility of these host plants to larval attack, when grown in close proximity to each other, was approximately as follows: Cabbage, collards, broccoli (heading), mustard, turnips (rough), beets, and rutabagas. The insect was not found on any native host plants in the Chadbourn area in 1935.

INSECTS AFFECTING MAN AND ANIMALS

Blowfly parasite may overwinter as adult.--H. E. Parish, of the Menard, Tex., laboratory, reports that in collecting hibernating insects in that locality during January, an adult *Brachymeria fonscolombei* Duf., one of the hymenopterous pupal parasites of blowflies, was found underneath the bark of a dead pecan tree. This finding gives some indication that this parasite may overwinter in the adult stage.

Note on longevity of winter tick larvae.--At Sonora, Tex., O. G. Babcock has observed that a number of larvae of *Dermacentor nigrolineatus* Pack. were still alive after a period of 202 days without feeding.

Winter activity of screw worm.--A. W. Lindquist, of the Bureau's laboratory at Uvalde, Tex., reports as follows: "A minor outbreak of *Cochliomyia americana* C. and P. occurred in Uvalde County in January. The cause of most of the trouble was docking sheep, although other types of wounds also became infested. The weather apparently was ideal for screw worm attack, being characterized by hot days above average and cool nights below average. Most of the ranchmen reported more or less screw worm trouble. One man had 26 cases in 100 docked sheep. Five collections from these showed *C. americana*, and probably all cases were of this species. A ranchman near Rio Frio reported that of 41 docked sheep, 25 were lost because of screw worm attack. Some of the cases observed were very bad, harboring from 1,000 to 2,000 *C. americana* larvae and many eggs. Of especial interest is the fact that most ranchmen neglected to examine and treat their stock and consequently tens of thousands of *C. americana* larvae dropped during January. If a fair percentage of these should go through until March we could expect a high population of *C. americana* with the advent of spring. Because of the below-normal temperatures from January 19 on, it is probable that most of the pupae will perish. Collections of maggots from wounds have been made from 16 cases from January 10 to 29 and *C. americana* were found in all. *Phormia* sp. was present in 8 of the cases. In view of the fact that diligent search for screw worm cases failed to reveal any *C. americana* infestation from November 15 to January 10, and the absence of good blowfly temperatures during this period, it is concluded that the large numbers of *C. americana* present in January (both in trap and collections) represented emergences from larvae dropped before November 15. This indicates a "carry over" period of about 64 days, with a daily mean air temperature of 54.3° F." At Sonora and Menard, Tex., about 150 miles north of Uvalde County and at a considerably higher elevation, no screw worm cases were observed in January. All cases of myiasis recorded were caused by *Phormia* sp. At the screw worm research laboratory, Valdosta, Ga., E. F. Knipling and B. Y. Travis have made the following observations: "No *C. americana* oviposited on experimental animals from December 11 to January 15. On January 16 a mass of *C. americana* eggs was oviposited on the shoulder wound of a sheep, and on January 18 a mass was deposited on the shoulder wound of a goat. In addition to these two masses, one mass of *C. americana* was oviposited on January 14 on the wound of a sheep infested with *Phormia*, and another mass on an infested wound of another sheep on January 18. No egg masses of *C. americana* were oviposited on the wounded animals from January 4 to 13. According to observations during October and up to December 10, the temperatures ranged high enough for *C. americana* to be active on practically every day during this time, especially on January 6, 7, and 8, when the maximum daily temperatures were 75°, 77°, and 78°, respectively. We offer the following explanation for this: It is probable that the rather low temperatures from December 16 to 28 (especially on December 27 when the minimum temperature recorded was 20°) killed the adults in nature. Those emerging after this period were not subjected to severe cold and no doubt survived. The fact that no eggs were oviposited during warm days such as on January 6, 7, and 8, may be due to the fact that the flies had not passed through the preoviposition period. Although the number of egg masses noted on the experimental animals is small, this at least shows that *C. americana* may become active at intervals during the winter months in this vicinity."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Five living larvae and three puparia of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were intercepted at New York on November 12, 1935. The specimens were taken out of 3 pounds of grapes in a dish in the captain's quarters on board a ship from Spain. Eggs and nymphs of the citrus blackfly (*Aleurocanthus woglumi* Ashby) and the cloudy-winged whitefly (*Dialeurodes citrifolii* (Morg.)) were intercepted at Miami, Fla., on November 11, 1935, on leaves of lime in cargo from Cuba. Living specimens of the scale insect *Lepidosaphes kamakurensis* Kuw. were found at Seattle, Wash., on April 4, 1935, on a camellia leaf in cargo from Japan. Living adults of the bruchid *Bruchus affinis* Froelich were taken at Washington, D. C., on November 7, 1934, in seed of *Lathyrus tuberosus* in the express from Issyk Kul, Union of Soviet Socialist Republics. Living specimens of the tettigoniid *Hexacentrus unicolor* Serv. arrived at Honolulu, Hawaii, on September 19, 1935, as pets in a cage in baggage from Japan. A living adult of the weevil *Phelypera distigma* Boh. was found at New Orleans on November 5, 1935, with banana debris in cargo from Mexico. The scale insect *Lepidosaphes uniloba* Kuw. was intercepted at San Francisco on September 26 and October 10, 1935, on *Alyxia olivaeformis* in baggage from Hawaii. Living specimens of the aphid *Trifidaphis phaseoli* (Pass.) were collected on October 11, 1935, on lima beans in the field at Cidra, P. R. Two larvae of the weevil *Centorhynchus ericae* Gyll. were taken at Philadelphia on August 30, 1935, on heather in the mail from Germany. This represents the first record in our files of this species being intercepted from Germany. The scale insect *Chrysomphalus rhizophorae* Ckll. was taken at Boston on June 29, 1934, on a lime in cargo from Dominica. A living specimen of *Sericothrips staphylinus* Haliday was intercepted at New York on December 17, 1935, in soil around the roots of holly in the mail from England. This is the first record in our files of this thrips being intercepted.

Pathological interceptions of interest.--Sclerotia and associated yellowish heads of an *Aspergillus* intercepted at New York September 18, 1935, seemed characteristic of *A. alliaceus* Thom. and Church. As this fungus was not known to attack any bulbs other than onion and garlic the material was referred to the Bureau of Plant Industry. Verification of the determination has now been received. *Bacterium maculicola* (McC.) McCulloch was intercepted from Spain for the first time on December 31 at Baltimore on cabbage. Bacterial spots apparently due to *Bacterium vesicatorium* Doidge were intercepted at El Paso on January 27 on husk tomato from Mexico and at New York on January 31 on eggplant from Trinidad, the spots being on the calyx in both cases and the first interception of the disease for both hosts. *Cladosporium fulvum* Cke. was intercepted on husk tomato for the first time on January 24 at El Paso in baggage from Mexico. Our first interception of *Colletotrichum omnivorum* Hals. from Sweden was made on January 20 at New York on Aspidistra. Our first interception of a disease on regal lily was made on leaves and stems from Mexico on January 25 at El Paso, the fungus being *Colletotrichum* sp. (or *Vermicularia* sp.) and apparently responsible for serious lesions on the host. A bamboo flower pot from Jamaica intercepted at New York on October 30, 1935, bore three fungi, *Coniosporium shiraianum* (Syd.) Bub. (first interception from Jamaica), *C. bambusae* (Thum. and Bolle) Sacc. (first interception), and *Microdiplodia* sp. differing from any species reported on the host. An interception of *Heterosporium allii* Campanile on January 16 at Baltimore enabled us to add Sweden to the countries from which this fungus has been intercepted on garlic. *Heterosporium allii* Ellis and Mart. was intercepted from Germany for the first time on January 5 at Philadelphia on leeks. A diseased croton leaf from Japan intercepted on January 10 at New Orleans was infected with what appeared to be *Laestadia minuscula* (Lev.) Sacc., a disease reported as occurring in Java. The material was scarcely mature and was inadequate for study. *Mycosphaerella* sp. was intercepted at El Paso on January 25 on *Pteris tremula* leaves from Mexico, apparently responsible for the death of numerous leaflets. Seymour lists no species of *Mycosphaerella* on ferns of this genus. Our first interception of *Phoma lingam* (Tode) Desm. from Asia was made at Seattle on January 8 in cabbage from China. *Ramularia lampsanae* (Desm.) Sacc.was intercepted for the first time on January 17 at New York in escarole leaves from England. *Rhabditis strongyloides* Schneider, of interest to nematologists, was intercepted on January 17, 1935, in parsnips from England and was finally identified recently. *Sclerotium opuntiarum* Speg. was intercepted for the first time on October 24, 1935, at the Inspection House, Washington, D. C., in *Pilocereus* from Argentina. *Sclerotium oryzae* Catt. was intercepted from Argentina for the first time on January 6 at New York in rice straw in mail. *Sclerotium* sp. was found in a California *Erythronium* bulb offered for export from New York, *Sclerotium* sp. was intercepted at New York on a narcissus bulb from England, and *Sclerotium* sp. was intercepted at the same port in snowdrop bulbs from Turkey. None of these fit species of *Sclerotium* known to occur on the hosts. An immature ascomycete, apparently *Venturia furcata* Fautr., was intercepted September 24, 1935, at New York on juniper berries from Italy. Fusicladium spots on quinces from Japan, intercepted at Seattle on December 10, appeared to be those of Venturia pyrina Aderh., our first interception of scab on quince. Vermicularia herbarum West was intercepted on October 23, 1935, at New York on carnations from Portugal. The only previous interception was from France in 1923.

Forbidden fruit.--During baggage inspection of passengers from a single boat in New York recently contraband fruit was found in baggage of 3 passengers from the Azores, 4 from Portugal, 4 from Greece, and 3 from Italy. From Italy there were oranges, tangerines, and pomegranates; from the Azores, oranges, apples, sweet limes, pears, and tangerines; from Portugal, apples, oranges, and sweet limes; from Greece, pears, pomegranates, oranges, and quinces. Mediterranean fruit fly was found in fruit from Greece only. Examination of stores in the same vessel resulted in finding that 130 grapefruit from Sicily were 80 percent infested with living larvae and pupae of Mediterranean fruit fly, our first interception of this host from Sicily.

Fruit fly served with airplane lunch.--Inspection at Brownsville of lunches supplied passengers on the airplane trip from Mexico City resulted in finding larvae of Anastrepha sp., probably A. ludens Loew, in a Mexican orange in one lunch.

DOMESTIC PLANT QUARANTINES

Forty States and the District of Columbia protected by transit inspection.--In the last quarter of 1935 transit inspectors intercepted 553 shipments of plant material and other restricted articles not conforming to inspection and certification requirements of the Federal interstate quarantines, consigned from regulated areas to 40 States and the District of Columbia. About 50 percent of the violations were from the Japanese beetle infested area, 39 percent from the gypsy moth infested area, and the remaining 11 percent from areas regulated under the quarantines relating to the Mexican fruit worm, the white pine blister rust, the pink bollworm of cotton, the Thurberia weevil, the sain moth, and the Woodgate rust, the latter intercepted at Philadelphia by inspector H. B. Colton, and representing the only violation of this quarantine found since it was established in 1928.

Phony peach disease under control.--A marked degree of control of the phony peach disease has been obtained as a result of the campaign of the past 6 years, which has been carried on cooperatively with the State officers. Peach growing in the area of severe infection is regaining its former place as the principal money cropof the area, according to William F. Turner, Bureau field leader of the project, in a paper recently delivered before a division of the Southern Agricultural Workers Convention at Jackson, Miss. "Aside from the definite results in economic control that have been achieved", Mr. Turner stated, "the work done has greatly decreased the probability of dissemination of the disease by means of infected nursery stock, principally through protection of such stock from possible infection." Owing to the slowness of the natural spread of the disease the first objective of the campaign is to stop any possible spread of the disease by artificial means. If this factor can be eliminated it is believed that complete eradication of the disease may be feasible in sections where it is just becoming established, and may not be out of the question in any area where it may occur, regardless of its prevalence.

Progress in citrus eradication.--More than 10,000 properties have been worked by W. P. A. crews in the removal of 5,000,000 nonproductive citrus trees in 10 counties in Texas and 13 parishes in Louisiana, in cooperation with these States. Eradication in Jefferson County, Tex., was begun early in February, following the recent thorough inspection of all citrus trees in the county and the discovery of canker on six properties. The cooperation of the public has been received in all regions worked, consent for removing the trees having been given by about 98 percent of the owners including a few who had heretofore refused such permission. Their changed attitude may be attributed both to the tact of the inspectors and the recognition of the value of the work to the citrus industry. More applications have been received for clearing out old abandoned citrus nurseries and grove trees in the lower Rio Grande Valley than the workers have been able thus far to meet. There is some shortage in relief labor in the valley, the men having gone into commercial channels at the rate of from 4 to 6 per week, finding work in canneries or packing houses, or in planting their own crops.

Worthless peach trees removed.--It is estimated that over 7,500 properties have been worked by W. P. A. crews in destroying abandoned peach orchards and other worthless peach trees in 129 counties of the South and Southeast, in the 6-month period ending January 18. More than 7,375,000 such trees have been eradicated for the control of the phony peach disease, averaging approximately 1,000 trees to each property.

CONTROL INVESTIGATIONS

Physiologist appointed.--J. F. Yeager, formerly Associate Professor of Physiology at Iowa State College, has been appointed Entomologist at the Bureau's Beltsville, Md., laboratory, effective January 2, 1936. Mr. Yeager will continue his work on the physiology of insects, working first on the effect of nicotine on the heart pulsations of the American cockroach. He is assisted by J. B. Gahan, Junior Entomologist.

New toxic compounds found.--D. E. Fink, Orlando, Fla., is continuing his tests of synthetic organic compounds against mosquito larvae. Recently certain compounds were found that were more toxic than rotenone to the larvae, but none was more toxic than phenothiazine.

Metal turntable in operation for testing insecticides.--A new metal turntable was recently delivered to the Beltsville, Md., laboratory. This will replace the wooden turntable formerly used by F. L. Campbell and W.N. Sullivan for testing extracts of insecticidal plants against house flies.

BEE CULTURE

Resistance of American foulbrood spores to heat.--Throughout the beekeeping literature appear recommendations that to make honey safe to feed back to bees, particularly honey the history of which is unknown, it be diluted and boiled in a closed vessel for 1 hour. These recommendations have persisted regardless of the fact that G. F. White, as far back as 1920, found that spores of Bacillus larvae were not all killed after 3 hours at a temperature of 93° C. Recently C. E. Burnside, of the Beltsville, Md., laboratory, obtained growth in culture in a number of instances where spores had been kept in boiling water for slightly over an hour. An attempt will be made to reconcile the apparent discrepancy between results obtained in actual practice and those obtained in the laboratory.

Physiologist appointed.--R. M. Melampy of the Animal Nutrition Laboratory, Cornell University, N.Y., was recently appointed Assistant Physiologist in Apiculture and reported for duty at the Southern States Bee Culture Field Laboratory, Baton Rouge, La., on February 5. Mr. Melampy will take care of the research dealing with the physiology of queen rearing and the physiological changes that affect such factors as fecundity, longevity, and behavior.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Larvae of a North American weevil in ash seeds from Austria.-- A. G. Boving has identified as Thysonocnemis fraxinii Lec. four curculionid larvae intercepted at Boston, Mass., by the Division of Foreign Plant Quarantines under Boston No. 11343, and recorded as occurring in seeds of Fraxinus pubescens arriving from Austria. The species is a North American form which infests ash seeds here. No representative of the genus Thysonocnemis has been known to occur in Europe, according to available records, although two species of Curculionidae, Otiorhynchus hirticornis Herbst and Cionis fraxinii Degeer, are associated with ash there. They are not seed feeders, however, and the larvae are easily distinguished from those of the Thysonocnemis.

Another European curculionid reported from the United States.--Specimens determined by L. L. Buchanan as Gymnaetron (Rhinusa) netum Germar, a European curculionid not before reported from North America, have been detected in the National Museum collection mixed with lots of the common G.(R.) teter Fab., the localities represented including points in New York, New Jersey, Connecticut, Pennsylvania, Virginia, and Iowa. The earliest date is July 3, 1914, on specimens collected at Farmingdale, N. Y. A series from Barcroft, Va., was reared by J. C. Bridwell from seed pods of Linaria vulgaris.

A dipterous parasite of a tarantula.--W. J. Baerg, of the University of Arkansas, has submitted for identification two specimens, in the early pupal stage, which were obtained from a tarantula taken near Tres Marias, Mexico, between Mexico City and Cuernavaca. According to the data accompanying the specimens, these emerged(presumably as larvae) about a year subsequent to the date on which the tarantula was captured. After considerable study, C. T. Greene has concluded that the specimens probably represent a species belonging to the family Apioceridae. If this conclusion proves to be correct, the case is of unusual interest, as nothing appears to have been reported concerning the habits of any member of this dipterous family.

A sarcophagid associated with human intestinal myiasis.--D. G. Hall has identified as Sarcophaga bullata Parker specimens reared by J. Whitlock, Kansas State Agricultural College, and recorded under Bishopp No. 23190 from larvae obtained from a case of human intestinal myiasis in Kansas. This appears to be the first record of this type of association for S. bullata, although the species has often been reared in connection with cases of subcutaneous myiasis and as a scavenger.

New parasites of economic insects.--In a paper published in December in the Journal of the Washington Academy of Sciences (vol. 25, 1935: 547-564), R. A. Cushman describes several new species of ichneumonid parasites of economic insects on Grapholitha molesta Busck, Cremastus grapholithae, an abundant parasite of the peach worm especially in the southern part of its range; on Epinotia nanana Trietschke, Phaeogenes epinotiae, Phaedroctonus epinotiae, and P. piceae; on Recurvaria piceaella Kearf., Phaeogenes epinotiae, Lissonota recurvariae, Neliopisthus piceae, and Phaedroctonus piceae; on Tomostethus multicinctus Rob., Aptesis ferruginea, Perilissus tomostethi, and Oocenteter tomostethi, the latter representing a new genus; on Laspeyresia youngana Kearf., Phaedroctonus temporalis.

Specimens of new apple leafhopper parasite shipped to New Zealand.--In the November number of the Proceedings of the Entomological Society of Washington, issued January 17, C. F. W. Muesebeck has described under the name Aphelopus typhlocybae, a new anteonine (dryinid) parasite of the white apple leafhopper (Typhlocyba pomaria McAtee). The material on which the description was based was reared by H. M. Steiner, of the Vassar College laboratory of the New York Agricultural Experiment Station at Poughkeepsie, N. Y., who has now reported that entomologists of the Cawthron Institute at Nelson, New Zealand, have recently obtained a shipment of these parasites from the New York institution in an attempt to utilize them in controlling the yellow apple leafhopper (Typhlocyba australis Froggatt).

EDITORIAL OFFICE

The attention of this office has been called to an amusing editorial entitled "Technical Language", published in Chemistry and Industry, Volume 55, number 6 (London). Although written in England for English chemists, it is believed that it may have value in America, for American entomologists. The editorial says:

"Sir Francis Acland recently wrote to The Times and quoted this statement about a moth: 'It would appear from what evidence is available that the act of oviposition is immediately stimulated by the crepuscular diminution in the intensity of illumination, and the rise in relative humidity as the diurnal temperature decreases.' Sir Francis believes that this means: 'Egg-laying seems to be stimulated by twilight and the dampness of evening.' He has chosen, quite rightly, a striking instance of the love of long and unfamiliar words; very many such sentences could be quoted from current chemical literature and probably a few could be found in the pages of Chemistry and Industry. We do not quite know why such a style is so much liked by many authors and, we suppose, many readers. It is sonorous and sexpedalian, like the late Sir William Harcourt, but we have never worshipped the long word when the short one is equally effective. In framing an address to a king or in drawing up a marriage settlement there is a style that is expected by the reader, one that has been hallowed by centuries of usage. Is it worth while for chemists to establish precedents of writing that are unnecessarily long and difficult? They are doing it, and if it is their wish no one can stop them. It was formerly thought dignified to write without using the short and common words. Dr. Johnson was a sinner whose example ought not to be followed. 'He was assaulted, during his precipitated return, by the rudest fierceness of wintry elemental strife; through which, with bad accommodations and innumerable accidents, he became a prey to the merciless pangs of the acutest spasmodic rheumatism' and so on. We think that we could write in that manner if we tried, but is it worth while? We have protested more than once, but if chemists wish to use a very learned style, it is futile to protest. We know that often one long word may express accurately the meaning of half a dozen short words; we have no complaint to make about this; we complain that the chemist uses 'optimum' when he means 'best', and uses optimum as an adjective into the bargain; we writhe when we see 'optimum conditions.' We complain when writers prefer 'function' to 'act'; 'the professor functioned as secretary', and so on. If we corrected papers as we should like to do, half the authors would never let us have their manuscripts again. It is all very sad."

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UNITED STATES

DEPARTMENT OF AGRICULTURE

BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME III, [illegible]

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR FEBRUARY 1936

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ANDREW N. CAUDELL

Andrew N. Caudell, entomologist on the Insect Identification staff and honorary custodian of Orthoptera at the National Museum, died at his home in Washington, D. C., on March 1, after an illness of 3 weeks following a stroke of paralysis. Mr. Caudell was born in Indianapolis, Ind., on August 18, 1872, and as a boy moved to Oklahoma with his family. In 1897 he graduated from Oklahoma State College. The following year he came to Washington to take a position with the Bureau of Entomology and was continuously employed in the Bureau from that date until the time of his death. Nearly all his efforts in entomology were in the taxonomy of the Orthoptera, to which he had contributed numerous papers and in which field he had become widely known as an authority. His wife, Nellie Cundiff Caudell, a daughter, Mrs. Elmer R. Shade, of Brooklyn, N. Y., and a sister, Mrs. Allie Cripe, of Tulsa, Okla., survive him.

SCREW WORM CONTROL WORK TO BE HANDLED AS A DIVISION

Effective March 15, 1936, the cooperative educational control work on screw worm will be handled as a Division with W. E. Dove in charge. The headquarters for the work will be in the field. Mr. Dove was in field charge of the work done last season under the direction of the Division of Insects Affecting Man and Animals. During the period of his new assignment he will be relieved of all the research he has been doing on sandflies and related pests and will devote his full attention to cooperative control work on screw worms. The Agricultural Bill now being considered by Congress will, if approved, provide funds for the continuation of the cooperative educational control work on screw worm in the Southeast and will extend the activities to the Southwest. This change permits placing maximum emphasis on research on insects affecting man and animals, including that done on screw worms. It will enable the leader of the Division of Insects Affecting Man and Animals to give research activities merited and undivided attention.

FRUIT INSECT INVESTIGATIONS

Laboratories closed.--The laboratory at Albany, Ga., for the mass production of the *Trichogramma* egg parasite for utilization in field tests for the control of certain pecan insects and the codling moth, was closed on February 29. Herbert Spencer, who was in charge of the work at this laboratory, will devote his full time to the leadership of the Orlando, Fla., laboratory. The sublaboratory at Orleans, Ind., for field tests of lights and baits to control the codling moth, was closed effective March 15. D. W. Hamilton is being transferred to work on the codling moth in the Hudson River Valley, N. Y., and S. A. Summerland will join the staff at the Vincennes, Ind., laboratory. The laboratory at Moorestown, N. J., for the field testing of baits to control the oriental fruit moth, was closed, effective March 12. W. P. Yetters, Jr., who has been in charge of that laboratory, has been assigned to the work on parasites of the oriental fruit moth.

Injury to cultivated crops by Japanese beetle larvae.--I. M. Hawley and T. N. Dobbins, of the Moorestown, N. J., laboratory, in summarizing the work of the year 1935 on this project, report on larval surveys made in 17 fields in southwestern New Jersey during the period August 20 to October 28, 1935. The larval population averaged 13.4 per square foot in asparagus fields, 12.6 in alfalfa, 6.7 in corn, 4.6 in peppers, 5.1 in potatoes, 4.6 in tomatoes, 9.1 in pumpkins, and 17.8 in pastures. The numbers of larvae present in fields planted to the same crop varied widely. Three pastures gave averages of 9.4, 15.2, and 21.6 per square foot; three asparagus fields, 26.0, 10.9, and 2.6; three corn fields, 8.7, 4.6, and 5.8; two tomato fields, 4.7 and 4.4; two pepper fields, 5.3 and 3.9; and two alfalfa fields, 10.4 and 13.9.

Control of adult Japanese beetle in rose greenhouses.--F. W. Metzger, Moorestown, reports that the first beetle of the 1935-36 winter season emerged from the greenhouse plots on February 4, as compared with emergence on December 27 in 1934. This difference in time of initial emergence is attributed to the severe winter, with the temperature at a lower level throughout the period than during the 1934-35 season. The total emergence to date has been light, but is steadily increasing. It is probable that the peak of the emergence will be considerably later than in the past two seasons.

Protection of truck crops from injury by Japanese beetle larvae.--F. E. Baker, Moorestown, reports on tests involving the growing of 30 different kinds of vegetables in soil treated with various concentrations of paradichlorobenzene after the soil had remained fallow for 30 days. The vegetable seeds were planted directly in the treated soil 30 days after treatment. The purpose of the test was to determine whether, after 30 days in the soil, a sufficient amount of the chemical had dissipated from the soil to eliminate, or at least to decrease, the detrimental effects to germination and growth noted when the seeds were planted on the day of treatment. The germination of the various vegetable seeds--asparagus, lima bean, string bean, beets, broccoli, brussels sprouts, cabbage, carrots, cauliflower, celery, pop corn, sweet corn, cucumbers, eggplant, endive, kohlrabi, lettuce, muskmelons, okra, onion, parsley, parsnip, peas, hot peppers, sweet peppers, radishes, spinach, tomatoes, turnips, and watermelon--planted in sassafras sandy loam 30 days after treatment with paradichlorobenzene at concentrations of 100, 200, 400, and 600 pounds per acre has been summarized. Radishes showed a significant decrease in germination in soil that had been treated with paradichlorobenzene at the rate of 400 pounds per acre; celery and sweet corn showed decreases in soil treated with 600 pounds per acre; and the other 27 varieties of vegetables apparently germinated normally.

Studies with Japanese beetle parasite.--In summarizing the laboratory propagation work with *Tiphia vernalis* Roh. during the past year, T. R. Gardner, Moorestown, has found that the mortality among parasitized grubs that died before development of the parasite was twice as great as among the nonparasitized grubs used as a check. The data obtained are as follows: Series held in temperature-controlled cellar, parasitized, grub mortality 43.6 percent; check, unparasitized, 22.1 percent mortality; series held in insectary, parasitized, grub mortality 51.5 percent; check, unparasitized, 29.9 percent mortality. All grubs originated in the same field, were dug at the same time, and were stored under the same temperature and humidity conditions. The grubs used in parasitization work were taken out of the storage chamber and handled approximately 4 times in 24 hours, during which time they were stung and oviposited upon by the female parasite and were then placed in the rearing cross-section trays. The grubs used in the check were taken out of the cellar at the same time and transferred immediately to the cross-section trays.

Fixation or removal of lead arsenate in soil.--The application of lead arsenate at the rate of 1,500 pounds per acre has been one of the most effective methods for destroying Japanese beetle larvae in large blocks of nursery stock in the field. However, when the necessity for growing the stock in larvae-free soil has passed, or when the nurseryman desires to grow plants susceptible to arsenic in the treated plots, or when conditions arise where the presence of large quantities of lead arsenate in the soil is not desirable, some methods for fixing the lead arsenate in an inert form in the surface layers or of eliminating it from the soil should be available. In cooperation with the New Jersey Agricultural Experiment Station, an investigation has been undertaken to determine methods for fixing lead arsenate in the soil in a form not injurious to plants. The investigation will consider immediately the following phases of the problem: (a) The normal vertical movement of lead and arsenic in different types of soil used for growing nursery stock in New Jersey; (b) identification of the different insoluble arsenic compounds formed in the soil; (c) determination of the effect of adding different materials on the fixation of lead and arsenic; (d) determination of the reaction of arsenic-susceptible plants in soil containing lead arsenate, to which various materials have been added for the purpose of fixing the insecticide. The headquarters for the project will be at the Japanese Beetle Laboratory at Moorestown, and the work will be carried on by W. E. Fleming and C. W. Mell.

MEXICAN FRUIT FLY CONTROL

Activities in lower Rio Grande Valley.--Although the shipping season for Texas citrus fruits does not end until March 31, it is estimated there remained in the area on February 29 only about three hundred cars for shipment. Several packing plants have closed entirely and many others are operating on part time. More adult *Anastrepha ludens* Loew were trapped in February than in any month this season. There was an increase from 49 for January to 83 for February. Of this number, 58 were trapped during the first half of the month. Inspections for larval infestations have been intensified throughout the month. Although many adults have been trapped in citrus groves, no larval infestations were found in February.

DATE SCALE CONTROL

Reed Garden still free from scale.--In February the Reed Date Garden in the Imperial Valley was inspected and no scale was found. The last scale found on the project was found in this garden in February 1934. Inspection was continued in the Imperial Valley in the infested area and leaf-base work was also continued. In the Coachella Valley scouting for unlisted volunteer palms was continued.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Derris dust kills western spotted cucumber beetle at low temperatures.--L. P. Rockwood, Forest Grove, Oreg., reports that on January 13, beetles that had assembled on fence posts when creek bottom lands were completely flooded were dusted with a mixture of derris root and "Red Dog" flour made up to a strength of about 1 percent rotenone. Care was taken to hit with the dust all beetles seen. Owing to the irregular distribution of the beetles, which ranged in numbers from 3 to more than 100 per post, no accurate checks could be made. The mean temperature for the 3 days following the dusting was 43.5° F., with a maximum of 50° and a minimum of 38°, and there were light rains, totaling 0.77 inch. The posts were examined on January 20, when the water had not entirely receded, and very few living beetles were found on or near them. On undusted posts the numbers of beetles were about the same as on January 13. Dead *Diabrotica soror* Lec. and dead weevils of *Hypera punctata* Fab. were found at the bases of the dusted posts. On January 29, 20 *D. soror* beetles, collected on January 20, were shaken up in a paper carton with a pinch of the derris-Red Dog dust and were then placed, with green vetch for food, in a clean carton. This carton was kept at unheated room temperatures--below 50° in the daytime and 40° or below at night. Within 24 hours all but 3 of these beetles had died. The survivors were unable to stand but could move some of their appendages when taken into a warm room, and the last of them died within 48 hours. None of the 100 undusted beetles in similar cartons died during this period.

Tolerance of field corn to European corn borer.--L. H. Patch and G. T. Bottger, of the Toledo, Ohio, laboratory, report as follows: "The rate of reduction in the bushel yield per acre per borer per plant of open-pollinated strains of corn has been compared with that of hybrid strains on 10 plantings during the last 5 years. In the absence of borers the mean yield of the open-pollinated strains was estimated to be 75.0 bushels per acre. For each additional borer per plant the yield was reduced 2.71 bushels. If the hybrid strains had yielded 75.0 bushels per acre in the absence of borers each additional borer per plant would have caused an estimated reduction of 1.65 bushels per acre. From this comparison, it may be observed that the damage by the borer was greatest on the open-pollinated strains, the yield being reduced about 1 bushel per acre more per borer per plant on them than on the hybrids. Hybrid strains are more vigorous in growth than common strains, which probably accounts for the greater tolerance of the hybrids as a group to corn-borer attack. The rate of reduction in the bushel yield per acre per borer per plant of single-cross hybrid Ill. A X Ind. Tr has been compared with that of other hybrid strains of corn on 8 plantings during the last 4 years. In the absence of borers the mean yield of A X Tr was estimated to be 107.4 bushels per acre. For each additional borer per plant the yield was reduced 2.21 bushels. For the same mean yield in the absence of borers of other hybrids as a group each additional borer per plant caused a reduction of 3.52 bushels per acre. Therefore it appears that single cross A X Tr is more tolerant to the corn borer than other hybrid strains as a group, the yield being reduced about 1.3 bushels per acre less per borer per plant on it than on other hybrids of equal yielding capacity. All of these comparisons are highly significant statistically."

Sweet-corn resistance to European corn borer.--Morris Schlosberg and Ralph Mathes, Toledo, report as follows: "Research on sweet-corn resistance to the European corn borer was inaugurated in 1935 as a cooperative project by the Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry. Tests were conducted near Toledo with sweet-corn strains received from the State experiment stations of Iowa, Minnesota, Illinois, Indiana, Michigan, and Connecticut. Analyses of the results obtained from multiple tests with 90 inbred and hybrid strains of sweet corn showed no differences between strain results with regard to egg deposition and larval survival which directly could be attributed to inherent resistance, although significant differences were shown among the strains. A wide range in strain results was obtained, but analysis of variance indicated that the major part of the differences was due to random variation in the experiment. Where significant differences occurred between strain results they appeared to be associated with differences of relative seasonal development of the strains during exposure to infestation, such as plant height, presence or absence of tassel, and degree of plant development, rather than to inherent resistant properties in the strains. However, the data of a single season's tests provide inadequate basis for definite conclusions. In connection with the above, the place of resistance should be clearly defined in regard to borer control. The term resistance should be applied to borer control where the control is influenced by inherent properties in a strain when the strain is favorably exposed to infestation. Resistance to the European corn borer may be shown by a strain in three phases: (1) Repellence to oviposition or borer attack; (2) inhibition of borer development; and (3) tolerance to borer injury. A strain may be resistant in one phase and highly susceptible in another. From a practical standpoint, therefore, the final measurement of resistance should be based on the reduction of damage when a strain is favorably exposed to borer infestation."

FOREST INSECT INVESTIGATIONS

Ips oregoni Eich. has long period of fall emergence.--L. G. Baumhofer, of the Fort Collins, Colo., laboratory, reports that data obtained from the caging of ponderosa pine thinning slash in the Black Hills show an emergence period of 73 days for I. oregoni. Slash cut on August 2, and infested a week or 10 days later, was placed in cages on September 25. Adult beetles, probably including some of the original parent adults, were leaving the slash on the date of caging and emergence continued until December 6. Heaviest emergence occurred during the last week in October, just prior to a week of cold, freezing weather. Subsequent emergence, comprising about 16 percent of the beetles, occurred on warm days. Total emergence averaged 113 adults per square foot of bark surface. Last spring it was found that a large percentage of the adults had wintered in the litter and duff. Although none were observed in this situation in September and October, it seems likely that, had further observations been possible, beetles could have been found in November, following the peak of emergence.

Emergence of the Black Hills beetle in southeastern Wyoming.--In analyzing the data obtained from cages placed on the lower boles of limber and lodgepole pine attacked by the Black Hills beetle on Elk Mountain in southeastern Wyoming, J. M. Whiteside, of the Fort Collins laboratory, reports the following points concerning the seasonal history of this beetle: (1) Emergence at 8,000 feet elevation started about August 1, 1935, and extended over a period of 47 days; at 9,000 feet emergence began on August 7 and lasted 40 days; and at 10,000 feet it started on August 15 and lasted 56 days. (2) After the beginning of emergence, the same number of days were required for the final 10 percent of the total emergence as were required for the first 90 percent. (3) Total emergence from limber pine averaged 164.5 beetles per square foot and was 804 percent greater than the average of 18.2 beetles from lodgepole pine.

Development of the European spruce sawfly under laboratory conditions.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports: "At intervals throughout the month spruce sawflies emerged from cocoons collected at various places in New England and New York. They were placed in cellophane bags on branches of young spruce trees. These bags proved to be more satisfactory than the wire cages, used earlier in the winter, which covered the entire tree. More eggs were laid in the cellophane bags, possibly because there was more light and the sawflies were more active. The eggs hatched in from 6 to 7 days and at the end of the month the larvae were in the early part of the second instar. One female emerged on February 8 from a cocoon spun up in the laboratory on January 7, from an egg laid in the laboratory on December 7. The remaining 9 cocoons of this series are still under observation. The generation completed development at the Connecticut Agricultural Experiment Station, under controlled temperature and humidity conditions, in 38 days. The much longer period required for our cocoons is caused by lower temperature and humidity conditions, particularly the latter. The larval period (from hatching of the egg to spinning of the cocoon) was almost the same length as that at the Connecticut Agricultural Experiment Station. A new series of cocoons will be placed in a controlled room for a further check on the relation of temperature and humidity."

Oviposition preferences of bark insects.--R. R. Whitten and W. C. Baker, of the Morristown, N. J., laboratory, have tabulated data obtained from elm logs and felled elm trees exposed to insect attack in the field during 1935. They state that when an entire tree was felled in the open, the smaller elm bark beetle (Scolytus multistriatus Marsh.) appeared to prefer the sides of the trunk for oviposition and the native elm bark beetle (Hylurgopinus rufipes (Eich.)) appeared to prefer the lower surface. The upper surface remained uninfested. Such results did not follow when the felled trees were shaded. The elm bark weevil (Magdalis sp.) apparently prefers the smaller limbs of elm, although its larvae were found in wood up to 9 inches in diameter. Of the small logs, this weevil preferred those suspended in trees, rather than those placed in a horizontal or vertical position on the ground. Except in the case of the elm bark weevil, there was no correlation between the diameter of the wood and the degree of insect attack. Of the cerambycid and buprestid larvae found in the material, approximately 95 percent were those of the common elm borer (Saperda tridentata Oliv.).

PLANT DISEASE CONTROL

Barberry eradication.--Expansion of field work in connection with barberry eradication was begun on March 1. At the close of the first week in March more than 1,200 men were employed. On March 1, approximately 38 percent of the W. P. A. funds allotted for barberry eradication had been used; 1,300,000 hours of employment had been provided men eligible for employment under the Emergency Act; and between 28,000 and 29,000 square miles of area had been covered by survey crews. Records show that 17,000,000 barberry bushes have been destroyed on 3,300 properties. It is expected that by April 15 our full quota of men will again be in the field and that during the next 6 months an average of about 3,000 men will be continuously employed. During the period January 5 to 8, E. C. Stakman, in charge of rust surveys, assisted by Wallace Butler, made observations concerning the overwintering of stem rust in Oklahoma, Texas, and Illinois. Mr. Stakman reports as follows: "No stem rust was found in the vicinity of Tulsa, Okla., on either wheat or oats, although leaf rust was fairly abundant on both. Near Purcell, Okla., some stem rust was found on oats, and in a field south of Fort Worth oat-stem rust was observed." According to Mr. Stakman, the conditions for overwintering of stem rust in northern Texas have been much less favorable this year than last. In February there were 14 days of alternate freezing and thawing on 4 of which the temperature remained below freezing throughout the 24 hours. No stem rust was found in Illinois.

Accomplishments in blister rust control in 1935.--The following table shows by regions the approximate results of blister rust control work carried on under all programs--Regular-Cooperative, E. C. W., P. W. A., and W. P. A.--during the calendar year 1935.

Region	Area worked	Ribes bushes destroyed	Labor
	Acres	Number	Man-days
Northeastern	1,099,237	27,401,596	370,824
Southern Appalachian	1,130,317	3,868,523	32,820
North Central	444,330	37,959,396	172,374
Western	363,192	67,627,540	285,358
Total	3,037,076	136,857,055	861,376

COTTON INSECT INVESTIGATIONS

Field population of pink bollworm in Mexico.--Examinations were made by C. S. Rude at Tlahualilo, Durango, Mexico, to determine the field population in six fields where cotton was grown in 1935. In two of the fields the stalks were cut, raked, and burned early in November and the land was later flooded. In those fields an average of 0.83 larvae per square yard was found alive. In three of the fields where the stalks had been cut, raked, and burned in November but where the land was not flooded, an average of 1.92 live larvae per square yard were found. In one field where the stalks had not been cut and no clean-up of any kind practiced, an average of 149.3 larvae per square yard were found. Of these, 139.3 were on the stalks and soil surface and 10 were in the soil. This field consisted of 260 acres, with an estimated population of nearly 188 million larvae, or 722,619 per acre.

Winter mortality of pink bollworms in surface trash.--A. J. Chapman and associates at Presidio, Tex., report that the mortality of pink bollworms in surface trash in old cotton fields between December 24, 1935, and March 1, 1936, was over 65 percent. The mortality among the hibernating larvae will probably be higher than that before any of these insects reach maturity and before there is cotton available on which they may oviposit in May and June. The mortality during the next 2 or 3 months will probably be increased by the plowing, irrigation, and cultivation of the fields. On December 24, after the cotton fields had been cleaned up, the surface trash from 50 square yards was collected for examination, taking it from 25 square yards each at two representative points in a field. A thorough examination of the locks, small bolls, old blooms, leaf trash, and other material in this surface trash gave an average of 12.58 larvae per square yard on December 24. A similar examination of trash collected on March 1 showed only 4.38 larvae per square yard. These two examinations indicate a mortality of 65.18 percent during this period of less than 10 weeks in midwinter.

Plowing and irrigation increase winter mortality of pink bollworm.--Mr. Chapman and H. S. Cavitt, studying the relation of cultural practices to the pink bollworm, report over 85 percent mortality of the worms following plowing and irrigation in January. From 15 square yards of surface soil collected immediately after the cotton was picked, there were obtained averages of from 94 to 113 pink bollworms per square yard (averages of from 82 to 86 worms in locks and trash on the surface and from 12 to 27 in the soil). On February 20, after these fields had been plowed and irrigated in January, an examination of 15 square yards of surface soil showed averages of only 12.8 to 13.8 worms per square yard, the percentage of mortality ranging from 85.77 to 88.69 in the three areas from which collections were made. The mortality will undoubtedly be greater before the new cotton crop is available for the moths.

Orchard burner for pink bollworm control.--Tests by D. A. Isler, of the Bureau of Agricultural Engineering, assigned to the Presidio laboratory, indicate that a field burner appears promising in controlling pink bollworm larvae in surface trash. The apparatus tested was a small, manually propelled orchard burner of the generator type. Samples of the surface trash before and after burning showed a reduction of from 87.8 to 98.6 percent of the worms, depending on the rate of speed.

Pink bollworm in Puerto Rico.--L. C. Fife reports that, owing to drought, most of the cotton on the southern coast of Puerto Rico had opened by the end of February and was only lightly infested by pink bollworms. A few fields of the old crop still standing on the northern coast contained green bolls, which were 45 percent infested. Many fields in this section were planted in February for the 1936 crop, which will be harvested from August to October.

Pink bollworm parasites.--L. W. Noble and W. T. Hunt, of the Presidio laboratory, report that adults of the European corn borer strain of Exeristes roborator Fab. emerged during the latter part of January and throughout February from pink bollworm infested material collected from fields where liberations of this parasite were made last season. No E. roborator emerged from cornstalks infested with the southwestern corn borer. The Egyptian pink bollworm strain of E. roborator began emerging at about the same time from larvae reared in the laboratory on pink bollworms in cotton locks. The Hawaiian strain of Microbracon mellitor Say began emerging in hibernation cages on February 6 and continued throughout the month. As yet no Chelonus blackburni Cameron has emerged from cotton bolls collected in fields where liberations were made last year.

Cotton flea hopper emergence.--K. P. Ewing and R. L. McGarr report that the first flea hoppers observed in the vicinity of Port Lavaca, Tex., this season were several first- and second-instar nymphs found on small croton plants on March 5. The first nymphs emerged in the hibernation cages on March 6. The emergence this year is about 3 weeks later than usual, owing to the cold winter, and this is the first time during the 4 years the cages have been run that no emergence occurred in February. H. J. Reinhard reports that the first emergence in hibernation cages at College Station, Tex., was also on March 6. T. P. Cassidy, of Tucson, Ariz., reports that flea hopper nymphs were taken abundantly in sweepings of Sphaeralcea in the Salt River Valley on March 11. No adults were present and emergence had recently begun.

Relation of Hemiptera to cotton boll rot.--T. P. Cassidy and L. D. Christenson report that during the summer of 1935 an examination of 18,700 cotton bolls from 33 fields in Arizona showed that 1.3 percent were rotted. The fungi responsible for rotted bolls were *Rhizopus nigricans* and *Aspergillus niger* (identified by R. B. Streets of the University of Arizona) and unidentified pathogens responsible for internal boll rot. Tests were made to determine the relationship of boll-puncturing insects to these boll diseases. Twenty percent of bolls confined with *Euschistus impictiventris* Stal developed boll rot, and 30.8 percent of the bolls confined with *Chlorochroa sayi* Stal developed boll rot. Tests with the cotton stainer *Dysdercus mimulus* Hussey have all resulted negatively, as did 146 check bolls sheltered from insect injuries. Internal boll rot occurred naturally only inside of insect-punctured bolls. Whether insects transport the boll-rotting organisms or merely provide wounds through which the rotting organisms infect has not been determined.

Effect of manurial control of root rot of cotton on soil-animal fauna.--L. D. Christenson has summarized this phase of his season's work at Buckeye, Ariz., as follows: "At the Bureau of Plant Industry station at Sacaton, Ariz., control of phymatotrichum root rot of cotton has been brought about by application of green and barnyard manures. During 1935 in cooperation with C. J. King, superintendent of the station, studies of the soil-animal fauna were undertaken in the plots in which root rot had been controlled and also in check plots. The manuring experiment was started in 1921. Faunal studies were quantitative, sampling being accomplished with a modified peat sampler. Organisms were extracted from the soil by means of Berlese funnels. A total of 58 samples from unmanured areas and 54 samples from manured areas were taken, and a total of 14,570 organisms, predominantly arthropods, were obtained from them. The results of studies made are summarized as follows:

Classification	Population densities per acre in 0-12 inch soil layers		Ratio of increase in--		Percentage of total
	Unmanured plots	Manured plots	Unmanured plots	Manured plots	
	Millions	Millions			
Nematodes[1/] ---	0.01	0.18	1	18.0	0.1
Earthworms-----	.60	1.24	1	2.0	1.4
Pauropoda-----	.14	.67	1	4.8	.6
Araneida------	.09	.18	1	2.0	.2
Acarina-------	23.63	27.07	1	1.1	38.8
Collembola----	20.60	39.30	1	1.9	45.8
Thysanura-----	3.31	3.86	1	1.2	5.5
Thysanoptera--	.20	.14	1	0.7	.3
Hemiptera-----	.37	.55	1	1.5	.7
Coleoptera----	1.07	1.64	1	1.5	2.1
Hymenoptera---	.30	.43	1	1.4	.6
Diptera-------	.06	.06	1	1.0	.1
Insect larvae-	1.80	3.00	1	1.7	3.7
Miscellaneous insects----	.10	.21	1	2.1	.2
Total------	52.28	78.53	–	--	100.0
Average----	--	--	1	1.5	--

[1/] Only larger, presumably parasitic nemas were counted.

The effect of manuring was to increase the numbers of soil animals present. The numbers of cotton-root-feeding species were stimulated, along with saprophytic and mycetophagous types. No qualitative effect of manuring on the fauna was noted. Accompanying the increase in numbers of soil animals, the following modifications of biotic, chemical, and physical properties of the soil were noted: (1) An increase in organic matter content; (2) an improvement in soil structure (as shown by volume weights and soil-resistance changes); and (3) an increase in the population densities of microfloral components, namely, coccoid bacteria, rod-shaped bacteria, linear actinomycetes, phycomycetes, ascomycetes, and undetermined fungi (as shown by evolution of CO_2 and the Cholodny method). No significant differences in soil pH values were noted. It is believed that the factors most likely responsible for increasing the densities of soil animals are (1) an increase in food supply (organic matter, live roots, decaying roots, and fungi) and (2) improved soil structure which, in effect, amounts to a spatial increase in the soil environment. Data indicate that the control of the cotton root rot fungus was achieved independently of the numbers of soil animals present. Similar studies in plots manured only 2 years show that control of root rot by manuring precedes quantitative modification of the soil-animal fauna which results from manuring.

Insects and crazy-top of cotton.--T. P. Cassidy and L. D. Christenson report observations on crazy-top, a type of growth abnormality of cotton plants peculiar to certain parts of Arizona. Careful studies by C. J. King, Bureau of Plant Industry, at Sacaton, Ariz., have shown that crazy-top results from water stress and certain soil conditions. It has been noted that there are certain similarities in the structure of crazy-top plants in Arizona and growth abnormalities produced elsewhere by certain insects, notably cotton thrips, tarnished plant bugs, and cotton flea hoppers. In cage and field tests during the past summer none of these insects produced growth abnormalities that could be confused with crazy-top. Large populations of tarnished plant bugs and cotton flea hoppers in the field also failed to produce crazy-top. It is considered unlikely that insects are concerned in this physiological disturbance of cotton plants.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild cotton eradication.--The wild cotton eradication program in southern Florida was somewhat handicapped during February because of rains. This was especially true at Cape Sable, where work had to be temporarily discontinued, but laborers are now being returned to the camp there to resume work. Inasmuch as the wild cotton grows along the low-lying coastal section and adjacent keys or islands of southern Florida, rains naturally interfere more with this work than with most of our other activities. A good deal of the wild cotton was found to be heavily infested with the pink bollworm in 1932, but practically all of this area has been cleaned one or more times, thus reducing the menace to the main Cotton Belt. No infestation has been found so far this season in the small number of bolls examined. During the month a first clean-up was made on 426½ acres, from which 5,075 mature and 31,354 seedling plants were removed. A recleaning was made on 8,570 acres, from which 1,134 mature, 676,388 seedling, and 16,284 sprout plants were removed. In addition a thorough survey for wild cotton was made on some 35,000 acres. This survey was made possible by the fact that the work is being carried on this year with W. P. A. funds and much larger crews are being used.

Thurberia-plant eradication.--The eradication of Thurberia plants was completed in the Tortillita Mountains of southern Arizona on February 14. A total of 59,283 plants were removed from the 64,680 acres covered. Many of the plants are infested with the Thurberia weevil. The eradication is being carried on to remove the menace to cultivated cotton, and, as the Tortillitas are nearest the farming areas, this range was worked first. The Santa Catalinas are next and work was immediately begun on that range. It is considerably rougher than the Tortillitas, but thus far no unusual difficulties have been encountered. By the end of the month 3,080 acres had been covered, from which 33,363 plants had been removed. This work is being carried on with W. P. A. funds.

Trap-plot cotton in the Big Bend.--Plans for trap plots of cotton in the Big Bend area of Texas for the coming season have just about been completed. This is one of the special control measures begun several years ago to reduce the pink bollworm infestation in this area and thereby lessen the spread to other areas. The other measures in the program are delayed planting of the cotton crop and the clean-up of fields after the picking season is completed. It has been determined that the peak of moth emergence in the Big Bend is completed by the latter part of May. No cotton is planted before April 15, therefore there are no blooms before the middle of June. Small plots of cotton are planted as early as possible to attract the moths emerging later in the season. The farmers prepare the land and plant and cultivate the plots, and the inspectors of this project pick all of the blooms daily. Tentative plans call for 12 plots, ranging in size from 1/2 to 1 acre. These plots are well distributed throughout the area. The land has already been prepared, and planting will be done about the middle of March. It will thus be seen that the trap plots will begin fruiting about 1 month in advance of the main crop.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Insecticide tests against Mexican bean beetle in Ohio.--N. F. Howard and his associates at the Columbus, Ohio, laboratory, report the following conclusions from insecticide tests against the Mexican bean beetle in Ohio during 1935. Satisfactory control was obtained with suspensions of derris root powder and cube root powder in water at dilutions of 0.01, 0.015, 0.02, and 0.025 percent of rotenone. Fairly satisfactory results were obtained with derris sprays containing 0.005 percent of rotenone. The incorporation of various wetting agents, spreaders, and stickers did not improve the efficiency of these spray suspensions. In general, cube proved to be approximately equal in effectiveness to derris when tested at the same dilution of rotenone. Derris dust mixtures and cube dust mixtures containing 0.4, 0.5, and 0.75 percent of rotenone, respectively, with various diluents, all gave satisfactory control. As a result of special tests of various diluents, it was concluded that it was not important to obtain any particular diluent for use with derris or cube dust, provided such diluent was nonalkaline in character. The results indicated that talc-flotation sulphur (50-50), wheat flour, ground marc, talc, bentonite, and finely ground dusting sulphur in the order named, with the last two almost equal in effectiveness, were as good as , or slightly superior to, any of the diluents tested. In general, derris dusts appeared to be slightly superior to cube dusts in effectiveness. In the tests with cryolite sprays it was necessary to use 3 pounds of cryolite to 50 gallons of water in order to obtain satisfactory control in severe infestations. In general, the cryolite sprays (natural or synthetic) proved to be about equal in effectiveness to derris sprays containing 0.01 percent rotenone, but not equal to derris sprays containing 0.015 percent rotenone. The cryolite dust mixtures did not prove to be equal to the derris or cube dust mixtures for bean beetle control. In a limited number of experiments, the ground root of devil's-shoestrings (Cracca virginiana L.) at a dilution of 0.01 percent rotenone, gave approximately equal results to those obtained with derris root powder sprays containing the same proportion of rotenone. Cracca root dust mixtures containing 0.39 and 0.4 percent rotenone, respectively, gave satisfactory control and were approximately equal to derris dust mixtures of the same rotenone content. In tests with phenothiazine, 2 pounds of this material in 50 gallons of water gave very satisfactory control, but in most instances it was not equal to derris containing 0.015 percent rotenone. Dilutions of 1 pound of phenothiazine in 50 gallons of water gave only fair control in severe infestations. Phenoothiazine diluted with talc 1-5 gave fairly satisfactory control in the one experiment where it was tested, but in no case did the phenothiazine-talc mixtures give as satisfactory control as derris or cube root dust mixtures containing more than 0.1 percent rotenone.

Salt flotation effective in separating weevil-infested seed peas.--T. A. Brindley, of the Moscow, Idaho, laboratory, in continuing his observations upon the efficiency of salt flotation in the separation of weevil-infested peas from sound peas, reports that examinations of approximately 160,000 peas that had been subjected to a new commercial salt-flotation process disclosed that only 101 of the treated peas contained the pea weevil (Bruchus pisorum L.) and that all of the weevils in these peas were dead. With one exception, the dead weevils were very small. The original weevil infestations in the peas contained in the lots examined ranged from 0.4 to 16.7 percent, with an average of 2.75 percent.

Effectiveness of naphthalene as a soil fumigant for wireworms varies with soil type.--R. S. Lehman, of the Walla Walla, Wash., laboratory, reports that recent laboratory experiments with pure naphthalene as a fumigant against the sugar beet wireworm (Limonius californicus Mann) in three types of soil, i. e., loam, sandy loam, and silt loam, have shown that mortalities were consistently lower in these types of soil in the order given. According to information obtained thus far, moisture does not appear to exert any significant effect on the efficiency of the naphthalene as a fumigant in the loam soil and probably only a slight effect in the sandy loam soils.

Wireworm damage to potatoes in Washington varies with time of planting and soil-moisture content.--K. E. Gibson, Walla Walla, reports that investigations of wireworm damage to potatoes at Walla Walla in 1935 demonstrated that potatoes planted on June 28 and harvested on October 25 showed less wireworm damage than those planted on March 19 and harvested on August 22 in the presence of approximately equivalent wireworm populations for both plantings. Also, these investigations showed that damage was less to potatoes in nonirrigated than in normally irrigated plots exposed to approximately the same wireworm populations.

Fluorine compounds effective against corn earworms on lima beans.--According to a report submitted by L. W. Brannon, of the Norfolk, Va., laboratory, the results of a field experiment in 1935 to determine the relative effectiveness of various dusts and sprays in controlling the corn earworm (Heliothis obsoleta Fab.) on lima beans on the Eastern Shore of Virginia, showed that synthetic cryolite, 60 parts, with talc 40 parts by weight, commercial barium fluosilicate undiluted, and commercial barium fluosilicate diluted at the rate of 80 parts by weight with 20 parts of wheat flour, gave the best control of any of the insecticides tested, as indicated by the increase in the average number of pods per plant over the untreated plots and by the reduction in the number of wormy pods per plant. No significant control was obtained with derris-talc dusts, with rotenone contents of 0.75 and 1.0 percent, respectively. Of the sprays used in the experiment, synthetic cryolite at the rate of 3 pounds to 50 gallons of water gave the best control of the corn earworm, the results being usually superior to those obtained with barium fluosilicate used at the rate of 5 pounds in 50 gallons of water. Negative results were obtained with water suspensions of ground derris root and ground cube root (containing 0.025 percent of rotenone). In general, the dusts were greatly superior to the sprays. It is planned to repeat these experiments in 1936 to determine whether harmful quantities of fluorine are present on the market product.

INSECTS AFFECTING MAN AND ANIMALS

Longevity of brown winter tick.--Continued observations by O. G. Babcock, Sonora, Tex., on various lots of seed ticks of Dermacentor nigrolineatus Pack. show that all specimens are still alive after a period of 233 days without food.

Ground devil's-shoestrings gives promise as a tickicide.--Mr. Babcock in some preliminary tests with Cracca virginiana has found that all D. nigrolineatus infesting a horse were killed on the third day after the animal had been treated once. All but one of a number of ticks of this species placed in a box containing the powdered material were killed in 31 hours.

Corn-cob oil effective against lice.--R. W. Wells, Ames, Iowa, reports that a mixture of Tripoli earth and 5-percent corn-cob oil by weight was highly efficient against nymphs and adults of the short-nosed ox louse (Haematopinus eurysternus Nitz.) but was not effective against the eggs.

Hibernation of screw worm fly Cochliomyia americana Cushing and Patton.--E. W. Laake, in charge of the screw worm research laboratory at Valdosta, Ga., reports that under winter conditions at Gainesville, Fla., "larvae that have dropped from a carcass and entered the soil may take as long as 67 days to complete their development and emerge as adults, and that pupae buried under 2, 4, and 6 inches of soil may continue development under adverse conditions for as long as 54 days and still emerge as adults."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Thirteen living larvae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were intercepted at San Juan, P. R., on November 8, 1935, in oranges in stores from the Canary Islands. Larvae, pupae, and adults of the West Indian sweetpotato weevil (*Euscepes batatae* Waterh.) were taken at Philadelphia on December 9, 1935, in sweetpotatoes in stores from Ecuador. This is our first record of this weevil being intercepted from Ecuador. The scale insect *Fiorinia juniperi* Leon. arrived at Seattle, Wash., on June 4, 1935, on Japanese yew (*Taxus cuspidata*) plants in ship's furnishings from Japan. Living and dead larvae, pupae, and adults of *Bruchus tristis* Boh. were intercepted at New York on November 23, 1935, in seeds of *Pisum sativum* in the mail from Italy. The larvae and pupae of this bruchid are new to the National Museum collection. An adult of the scarabaeid *Epicometis hirta* Poda was taken at Buffalo, N. Y., on December 19, 1935, in a dried blossom of *Opuntia* sp. in the mail from Italy. Living specimens of *Liothrips vaneeckei* Pr. arrived at New Orleans on June 5, 1935, in and on lily roots in stores from Japan. J. R. Watson, of Gainesville, Fla., states that this is the first record of this thrips from Japan. An adult of the coreid *Cebrenis centrolineata* Westw. was intercepted at the airport at Brownsville, Tex., on December 30, 1935, on a gardenia in cargo from Mexico. *Bruchophagus gibbus* Boh. was taken at Washington, D. C., on November 15-22, 1935, with seeds of *Elymus*, *Ephedra*, *Melica*, *Melilotus*, and *Poa* in the express from Mongolia. A. B. Gahan reports that this eurytomid is probably phytophagous. Living specimens of *Thrips fuscipennis* forma *corticina* Pr. arrived at Baltimore on September 26, 1935, on cuttings and leaves of pine in the mail from Germany. A living specimen of the bean pod borer (*Maruca testulalis* Geyer) was intercepted at San Francisco on January 3 on flower leis (*Dioclea violacea*) in baggage from Hawaii. A living specimen of the lygaeid *Lygaeus teapensis* Dist. arrived at Galveston, Tex., on November 26, 1935, with banana debris in cargo from Mexico. A living adult of the weevil *Orchidophilus aterrimus* Waterh. was intercepted at Honolulu, Hawaii, on October 21, 1935, among the roots of an orchid, *Grammatophyllum multiflorum*, in baggage from the Philippines. According to L. L. Buchanan, the species *aterrimus* Waterh. has been taken from the genus *Acythopeus* and placed in the genus *Orchidophilus*.

Pathological interceptions of interest.--Small spots on pods of peas from Cuba intercepted at New York on February 24 were filled with bacteria. The symptoms did not fit those of *Bacterium pisi* (Sack.) E. F. S. or other bacterial pathogens known to attack peas. Secondary bacteria often multiply under transit conditions, therefore the status of this material is uncertain. Citrus canker (*Bacterium citri* (Hasse) Jehle) was intercepted at Baltimore on February 24 in a navel orange from Japan. Our first interception of *Cercospora hibisci* Tr. and Earle was made at Tampa on January 15 on okra from Cuba. Our first interception on the genus *Eurya* was made at Seattle on February 4, *Colletotrichum* sp. on *E. japonica* from Holland. Our first interception of *Cylindrosporium brassicae* Fautr. and Roum. was made at Philadelphia on February 20 on petsai cabbage from Japan. *Gloeosporium concentricum* (Grev.) B. and Br. was intercepted from Belgium for the first time on February 16 at Philadelphia on cabbage. *Glomerella cingulata* (Ston.)

Spauld. and Schrenk was intercepted on Aucuba leaves from Italy on October 31, 1935, at New York. The only previous interception of the disease on Aucuba was made in 1916. Godronia cassandrae Peck was intercepted from Estonia for the first time on January 10 at New York in a large shipment of cranberries. Our first interception of a mildew on Billbergia is Oidium sp. on B. speciosa from Japan taken at Boston on January 31. Phytophthora sp. was intercepted on lily bulbs from Holland on February 13 at New York. Phytophthora sp. was intercepted on two lots of eggplant from Cuba on January 28 at New Orleans. A similar interception was made in 1931. British Guiana has been added to the list of countries from which Sclerotium oryzae Catt. has been intercepted. The interception was made at New York on January 24 in rice straw. Septobasidium pseudopedicellatum Burt was intercepted on January 3 at Miami on tangerines in baggage from Cuba. Thecopsora padi (K. & S.) Grove was intercepted from Sweden for the first time on February 17 at New York on cones of Picea abies. The rust was heavily parasitized by Darluca filum (Biv.) Cast. Uredo sp. was found on a leaf of Laurus sp. cuttings from the Azores intercepted at Boston on February 13. We have no previous interception record of a rust on this host.

Mal secco disease of lemons.--A serious disease of lemons in parts of Italy called "mal secco" disease is at times reported as affecting the fruit. Careful inspection of shipments arriving in this country, including culturing of material submitted by inspectors as doubtful, has failed to disclose any evidence of the disease organism Deuterophoma tracheiphila Petri.

Interceptions continue to increase.--Pest interceptions as recorded in Washington continue to increase, the totals for the calendar year 1935 being 56,199, as compared with 35,750 for 1934. January 1936 set a new all-time high of 6,540 interceptions for 1 month.

DOMESTIC PLANT QUARANTINES

Pussy willow interceptions unusually numerous.--Sixty-two shipments of pussy willow cuttings consigned from points in the satin moth infested area of the western half of Washington State were intercepted during the first 6 weeks of the year. The greatly increased number of such interceptions over previous years is probably due to a recent reorganization of transit inspection schedules at Pacific Northwest points by M. E. Connolly. Nearly all these violations were intercepted at the stations of Seattle and Spokane. With the exception of two, the shipments were noncommercial and, on being notified of the quarantine restrictions, consignors expressed a willingness to cooperate in the Department's pest-control activities.

Office space provided for Pittsburgh inspector.--Office quarters have recently been obtained for the Pittsburgh inspector, K. S. Rohwer, whose address is 438-L, Central Post Office Building. Pittsburgh is situated on the boundary line of the area regulated under the Japanese beetle quarantine and the number of violations found at this strategic transfer terminal indicates the importance of this station as a year-round transit-inspection point. Eighteen shipments were intercepted there in January, placing the station second only to Boston in the number of violations found in the month.

Phony peach disease inspection begins.--Plans have been completed for an extensive campaign of inspection for the phony peach disease in the peach-growing areas of the 13 infected States, and for a complete survey of about 9 States where the disease is not known to exist. The work will require the services of approximately 100 Federal and State inspectors. For the past several weeks the W. P. A. labor available for the control of this disease has been concentrated on the destruction of escaped peach trees which grow in large numbers in wooded areas and along fences and terraces in the infected States. Beginning when the trees are in bloom in the extreme South and working northward as the season advances, the work of finding and destroying trees while they are easily distinguished is accomplished with a high degree of efficiency. Nearly 6¼ million of such escaped trees have been destroyed by the relief workers over the period from early in August to February 15, as compared with over 2½ million abandoned trees.

Interesting interceptions.--Of the 277 violations of Federal plant quarantines intercepted by transit inspectors since the first of the year, the following are of special interest: Several shipments of uncertified lumber and of old empty cable reels from the gypsy moth area, reported seen by Inspectors Burns and Sawyer, of Boston; combination shipments of Oregon grape and pussy willow, in violation of two Federal quarantines, seen at Omaha by N. H. Dunlap, and at Spokane by M. E. Connolly; and a freight shipment of bulbs in pottery bowls covered with green rooted moss, and a small quantity of soil, from the Japanese beetle area, without the beetle certificate, intercepted at Indianapolis by William R. Walton. A shipment of currant and gooseberry plants in a bundle of old newspapers, mailed from England with no return address and moving in apparent violation of the foreign quarantine relating to white pine blister rust, was also seen at Omaha by Mr. Dunlap, who referred it to the responsible port inspector.

Pine-nursery inspections start early.--Applications for permits to ship five-leafed pines interstate from blister rust infected States under the provisions of Federal quarantine No. 63 are coming in and special arrangements are being made this year to make inspection for Ribes in the sanitation zones early in the season, before competing vegetation obscures such plants, since Ribes leaves normally appear from 1 to 3 weeks in advance of most other native wild plants. Timely eradication, which should be completed prior to May 31, will result in more efficient and less expensive protection.

Another Texas County inspected for citrus canker.--Following the discovery in December 1935 of citrus canker in Jefferson County, Tex., attention was directed to Orange County, bordering on the north. The recent inspection of stock in two nurseries and of 35,000 abandoned and dooryard trees has thus far disclosed no canker in the county. The work of the W. P. A. crews in removing 1½ million nonproducing citrus trees from the

Galveston-Houston-Beaumont area, including the two above-named counties, in recent months, is a vital factor in the fight to eradicate this disease from the country.

INSECTICIDE INVESTIGATIONS

A new nicotine insecticide.--The search for new nicotine insecticides in which the nicotine is fixed in water-insoluble form has resulted in a product called nicotine peat. As the name indicates, it is a combination of nicotine and peat, the latter being an organic acidic type of soil. It can be used as a dust or in a spray. About a dozen different types of peat have been examined for nicotine-combining power, the best of these being German moss which produces a product having 9.7 percent nicotine. However, by pre-treatment of the peat with hydrochloric acid the nicotine content can be raised. Thus there has been made from New Jersey peat a 12.3 percent product, which represents the highest content of nicotine thus far attained. Tests at a dosage of 5 pounds per 100 gallons show 90 percent of the contained nicotine to be insoluble in water. Efforts are being made to obtain a supply of this material for field tests to be made this season on apple trees for codling moth control. An article by L. N. Markwood, of this Division, containing more detailed information, is soon to appear in Industrial and Engineering Chemistry.

Does nicotine occur in tobacco as a glucoside?--An Italian, N. A. Barbieri, in 1928 described the isolation of a nicotine compound called "tabacin" from tobacco and referred to it as the toxic principle of tobacco, leading one to believe that nicotine occurred principally in this form. Tabacin was found to be a glucoside of nicotine containing in addition to nicotine some nitrogen which on treatment with acids or alkalies formed ammonia. A Japanese, Yamafuji, in 1932, apparently unfamiliar with the work of Barbieri, found two glucosides of nicotine. One of these, tabacinin, occurred to the extent of 0.01 to 0.03 percent, and the other, tabacilin, was present to 0.4 to 0.5 percent. Tabacilin seems to correspond approximately with Barbieri's tabacin, but Yamafuji does not mention the formation of ammonia from either of his glucosides. Tabacilin dissolves easily in alcohol, whereas tabacin dissolves only in hot alcohol and usually separates on cooling. An attempt has been made by C. R. Smith, of this Division, to prepare the glucoside tabacin or tabacilin, but after several months' of study of both nonfermented and partly cured tobacco, it appears that no glucoside is present in the species of Texas Cuban tobacco used by him. It is possible that certain varieties of tobacco might yet be found to contain a glucoside of nicotine, although the prospect does not seem promising. It is planned to test other tobaccos by a procedure recently adopted as indicating the presence of possible glucosides. So far, it would appear that nicotine occurs in tobacco only as salts of malic, citric, oxalic, and other organic acids.

Eastern apple-washing studies completed.--Cooperative apple-washing experiments were resumed at Washington, D. C., during the fall of 1935. The fruit for these experiments was obtained by M. H. Haller, of the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, from the experimental plot of the Division of Fruit Insect Investigations, Bureau of Entomology and Plant Quarantine, at Martinsburg, W. Va., and washed at the University of Maryland, College Park, Md., in the washing machines of the Horticultural Department. The fruit was then stored at 30° F. until wanted for analysis. The only insecticide used was lead arsenate. Duplicate lead determinations were run in all cases, using 30 fruits for the unwashed and 15 fruits for the washed lots. In all, 947 analyses were made during the season. The total spray residue ranged from 0.08 to 0.23 grain of lead per pound of fruit. Of the 41 washing treatments used, only 4 were effective in removing the lead residue to the tolerance in all spray plots. The two best single washes were (1) 1-1/2 percent hydrochloric acid + 1 percent Vatsol at 100° F., and (2) 1-1/2 percent hydrochloric acid + 1 percent mineral oils at 110°. The other two effective treatments spoken of consisted of double washing, using 1-1/2 percent hydrochloric acid at 110° and 80 pounds sodium silicate per 100 gallons water at 110° in this and the reverse order.

Dispersion of chemicals through trees studied.--A study of the distribution of chemicals injected into trees as preservatives and protection against bark beetle has been undertaken by the Division of Insecticide Investigations in cooperation with the Division of Forest Insect Investigations. Groups, each consisting of five trees of Southern short leaf pine, were injected with two different dosages of each of five chemicals, i. e., copper sulphate, sodium arsenite, zinc chloride, mercuric chloride, and sodium fluoride. Cross sections at five different heights above the ground were taken and divided into six concentric rings of equal width, making a total of thirty samples representing each tree. These samples are being analyzed for their percentage content of the chemical injected.

Color test for rotenone improved.--L. D. Goodhue has described in the Journal of the Association of Official Agricultural Chemists, volume 19, number 1, pages 118-120 (February 1936), an improvement in a previously published colorimetric method for the determination of small quantities of rotenone. The test has been made more delicate and more stable. It is suitable for the analysis of small samples of rotenone-bearing roots, for the analysis of spray residues of derris and cube, and for following the photochemical decomposition of rotenone. The test is made on acetone solutions adjusted to contain between 5 and 250 micrograms of rotenone per cc.

Another index of mothproofing materials now available. R. C. Roark and Mrs. R. L. Busbey have continued their compilation of the patents relating to the mothproofing of fabrics and other materials, and "A Third Index of Patented Mothproofing Materials" was issued in February as a 104-page mimeographed publication of the Bureau.

BEE CULTURE

Cooperative studies in supersedure.--The supersedure project already under way and the proposed project on disease resistance have caused beekeepers in various States to express increased desire to join their forces with those of the Federal Government in attacking beekeeping problems on a cooperative basis. Memoranda dealing with the supersedure project are under consideration with the Iowa State Experiment Station and the Kansas State Experiment Station. Each of these institutions will furnish equipment and will arrange for taking the necessary records on queen bees of known history, and supplied by this Division. The cooperating institutions will also be supplied with package bees for use in this work. Queen rearers and package-bee producers in the South, as well as commercial honey producers in the North, are cooperating with Federal agencies to further this project. Queen rearers are permitting their operations to be checked so that data will be available as to the conditions under which queens used in the work were reared. This data should indicate whether or not these conditions play a part in supersedure. The cooperating honey producers in the North are giving the use of colonies and equipment for the installation of packages and the introduction of queens under both normal and experimental conditions, as well as permitting adequate checks and records to be made from time to time.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A species of Scarabaeidae from an ant nest.--Three mature larvae associated with a newly transformed adult of the scarabaeid Serica lecontei Dawson, all taken from the nest of an ant, Formica exsectoides Forel, at Fairland, Md., by Elizabeth Haviland on November 25, 1935, were recently submitted for identification. A. G. Boving reports that the larva of S. lecontei has not previously been known and represents a remarkable intermediate type between other known Serica larvae and the usual larvae of Melolontha.

Tabanus pygmaeus Will. in Delaware.--Included in material submitted for determination by Donald McCreary was a single specimen collected by him at Nassau, Del., on June 11, 1935, which Alan Stone has identified as belonging to this rare and interesting species. T. pygmaeus has previously been reported from Florida only and has been taken infrequently, no specimens having been in the collections of the National Museum. It superficially resembles T. pumilus Macq. and T. sparus Whitn., but differs markedly in several structural features.

An interesting new aphid from California.--Specimens of aphids taken on leaves of Cocculus laurifolius at Niles, Calif., on December 28, 1935, and submitted by H. H. Keifer, of the California State Department of Agriculture, have been identified by P. W. Mason as Thoracaphis sp. No species of this genus seems to have been recorded from America up to this time, the group having apparently been confined to the Orient. Several species have been described from Japan, Formosa, China, and Java, but none from the host mentioned.

INSECT PEST SURVEY AND INFORMATION

Survey starts new season.--The March 1 number of the Survey Bulletin opened Volume 16. It is especially desired that contributions of survey data be received from the field workers of the Bureau. Notes on the abundance or scarcity of any insect, the extent of damage being done, the abundance of parasites or predators, and the effect of soil, climatic conditions, or other factors on abundance, are very valuable in the aggregate, although apparently of little significance to the individual observer. Reports from the Bureau's workers should be among the most frequent and valuable made to the Survey.

Phyllophaga adults desired.--We are particularly anxious to receive collections of Phyllophaga adults, as a cooperative project on these insects is now being carried on by several divisions of the Bureau. Each evening's collection should be tied separately in cheesecloth and all should be kept in 70-percent alcohol for 1 week. Material can then be removed from alcohol and shipped damp. If material is collected while the insects are feeding, the material from each kind of plant should be kept separate.

JAPANESE BEETLE CONTROL

Nursery shipments at standstill.--Extremely cold weather, frozen ground covered with snow, and icy roads caused delay in the shipment of nursery stock and hampered the activities of inspectors throughout the entire Japanese beetle regulated area.

Exhibitors informed of certification requirements at National Flower Show.--Communications were addressed to all growers expecting to exhibit at the National Flower Show to be held in Baltimore from March 14 to 21, informing them of the procedure to be followed if they desired to remove their plants to nonregulated points at the conclusion of the show. Thus forewarned, exhibitors from nonregulated territory or dealers contracting for delivery of their stock to outside points will be enabled to obtain certification for stock produced under the prescribed safeguards.

Preparations for spring activities.--The treating division has completed the overhauling of soil-sampling equipment and the construction of new carbon disulphide injectors. Everything is in readiness to gather samples of lead-arsenate-treated nursery plots as soon as soil conditions will permit. A representative of the Bureau of Agricultural Engineering has made a number of improvements in the bean-debeetling machines. Some of the machines are being motorized to speed the inspection of large quantities of beans.

Beetle collected with male and female legs.--Examination of the genitalia was necessary to determine the sex of a single adult Japanese beetle collected while an inspector was scouting the premises of a wholesale cut-flower dealer in Baltimore. Usually the sex of an adult may be determined by the structure of the tibial spur of the first pair of legs. In this specimen, however, the right tibial spur is elongated as in the female and the left spur is pointed as in the male. An examination of the genitalia showed the specimen to be a female.

Adult beetles in greenhouses.--During cloudy weather and with the outside temperature at 15° F., employees from the Philadelphia office collected over 100 adult Japanese beetles in a range of greenhouses at Yardley, Pa.

Gypsy moth inspector accompanies work train.--During the month the district inspector at Framingham, Mass., spent a day on a Boston & Maine Railroad work train, looking over car-rail stands where spare rails are stored along the railroad right-of-way. Conditions of gypsy moth infestation in the neighborhood of these stands were determined. Each year these old scrap rails are collected and shipped to points outside the gypsy moth regulated zone. No infestation was found near any rail piles examined.

Midwinter shipment of spruce trees.--On February 1, 12,600 spruce trees ranging from 6 to 8 feet in height were certified for shipment from Claremont, N. H., to Richmond, Va. These trees were dug from the forest just prior to the freezing of the ground, at which time they were assembled and inspected. At the time of inspection it was expected that some of the trees would be shipped to southern points outside the Japanese beetle regulated territory, therefore the roots were washed and packed in sphagnum moss.

Gypsy moth road stations continued throughout winter.--Severe weather conditions greatly reduced vehicular travel through the gypsy moth road stations in western Massachusetts and Connecticut. Stations were operated at all times, except when the halting of cars involved serious accident hazard because of icy roads.

Paving blocks certified from Massachusetts quarry.--Five carloads of granite paving blocks were shipped to Troy, N. Y., in mid-February from a quarry in eastern Massachusetts. Although the snow was several feet deep, the inspector was able to certify the shipment because the blocks were piled away from tree growth and the surrounding bushes had been kept cut.

Elm sanitation progresses in Westchester County.--Sanitation work in upper Westchester County, N. Y., is progressing rapidly. On February 24 only 21 areas out of a total of 131 remained to be assigned to field workers. These areas have a population of only about 17,000 dead and dying elms. In lower Westchester County, 32 out of 74 areas have been assigned to crews.

Supervision of transients.--At the request of the Westchester County Park Commission, the project has furnished supervisors to direct the work of two sanitation crews, comprising a total of 33 men, from the two transient camps at Elmsford, N. Y. These crews are marking and removing dead and dying elms from park property along the Saw Mill River Parkway. The supervisors supplied are skilled W. P. A. workers.

Eradication and sanitation personnel.--At the end of February there were engaged in Dutch elm disease activities 3,096 W. P. A. workers, 882 enrollees from exclusively Dutch elm disease C. C. C. camps, 125 men from other C. C. C. camps, 34 men from transient camps, and 65 personnel on regular Departmental appropriation. State personnel assigned to this work numbered 22 appointed men and 23 per diem workers.

Dutch elm disease infection records.--At the end of the month the known cases of Dutch elm disease totaled 14,240, with 5 confirmed trees still standing. In the sanitation work, 1,078,948 dead and dying trees had been removed and 405,353 trees of this type had been tagged for future removal. Sanitation activities in the areas to be made elm-free accounted for the removal of an additional 264,087 elms.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Moth control in the various States.--Up to March 1, under the W. P. A. projects, the numbers of workers employed under the gypsy moth projects in the different States were as follows: Maine, 176; New Hampshire, 120; Vermont, 731; Massachusetts, 739; Rhode Island, 108; Connecticut, 736; New York, 192; New Jersey, 110; Pennsylvania, 957; total, 3,869. On the same date, under the W. P. A. emergency project, the numbers employed on brown-tail moth work were: Maine, 572; New Hampshire, 575; Vermont, 21; Massachusetts, 568; Rhode Island, 12; and Connecticut, 34; total, 1,782. Under the brown-tail moth project much of the time is being spent in cutting winter webs. However, in 33 towns in Massachusetts, 33 towns in New Hampshire, and 34 towns in Maine all of the webs have been cut and efforts are now being made to cut and remove worthless apple and cherry trees and other favored foods. Up to the last week in February, 633,233 brown-tail moth webs have been cut in Maine, 1,700,224 in New Hampshire, and 459,200 in Massachusetts. One brown-tail moth infestation has been found in Rhode Island, located on a few apple trees in Barrington. This is the first infestation found in Rhode Island since before the removal of the quarantine in July 1922. In February arrangements were completed with the Pennsylvania Department of Forests and Waters whereby some of the buildings at the C. C. C. camps recently abandoned near Avoca, Pa., were made available for the storage of arsenate of lead, spray hose, and other materials purchased for use in connection with the gypsy moth eradication campaign being carried on in that State. This arrangement temporarily relieved our storage situation in Pennsylvania, a situation that is rapidly becoming acute. As this project was, until recently, unable to obtain all W. P. A. workers requisitioned for duty assignments in towns bordering the Connecticut River in Vermont and New Hampshire, it was possible to examine only a little area in lowlands along this river prior to the serious flood that began about the middle of March. It is feared that much infested debris was washed down stream by this flood and may result in many new infestations becoming established in Massachusetts and Connecticut adjacent to the river. Many of the cities and towns in the New England States, where Federal W. P. A. gypsy moth work is being carried on, have furnished storage space, without cost to the Government, for equipment used for transporting to and from work W. P. A. workers who were referred for duty assignments on this project from these towns. This splendid cooperation has been very helpful to this project.

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FRUIT INSECT INVESTIGATIONS

Raisin-drying methods, effect on moth infestation.--Thirty-eight samples of Thompson Seedless raisins, dried on wooden trays, were compared by H. C. Donohoe, of the dried-fruit insect laboratory at Fresno, Calif., with an equal number of samples of the same variety dried on paper trays rolled, after drying was partially completed, into a package called the biscuit roll. Infestation by the raisin moth (*Ephestia figulilella* Greg.) averaged 48,000 per ton in the former and 13,000 per ton in the latter. Drying of raisins on wooden trays is completed by piling the trays in stacks in which the fruit is shaded and accessible to insects, whereas the folding and rolling of the paper trays gives considerable protection from infestation.

Screening raisins to remove insect infestation.--By use of a portable shaker screen run by an electric motor which turned the offset crankshaft about 450 r. p. m., Mr. Donohoe succeeded in removing about 78 percent of the infestation by the raisin moth in samples of raisins of the Thompson Seedless variety. The work was done on ranches as the raisins were being removed from drying trays. About 43 tons, from 15 crops, were sampled before and after sifting. As an efficiency of 95 percent was obtained under the best conditions, improvements in the machine and in its operation are expected to result in better performance. The machine appears to be effective also in removing sand from the fruit.

Effectiveness of oils in control of San Jose scale.--O. I. Snapp and J. R. Thomson, of the peach-insect laboratory at Fort Valley, Ga., have just completed recording the results of experiments to determine the effectiveness of blended oils, as compared with straight-run oils, for the control of *Aspidiotus perniciosus* Comst. on peach trees. They report that tests with five different blended oils, each at a 3-percent strength, gave just as good control of the San Jose scale on peach trees as did the straight-run oils at 3-percent strength. In similar tests conducted at strengths of 2 percent, almost as good control of the San Jose scale resulted from the use of the blended as from the straight-run oils. From the results of these experiments, Messrs. Snapp and Thomson concluded that, when used at the recommended strength of 3 percent, a blended oil is just as effective as a straight-run oil for the control of the San Jose scale on peach trees in the South. Other experiments carried on to determine the relation of the volatility of lubricating oil to the control of the San Jose scale on peach trees showed that the volatility factor up to 5.4 percent has no effect on the control of that insect in the latitude of Fort Valley, provided, of course, that the viscosity was within the recommended range (125 seconds or higher, Saybolt). Oils having a volatility of from 8 to 13 percent were less effective in scale control.

Effect of cold winter on Japanese beetle larvae, preliminary report.--I. M. Hawley and T. N. Dobbins, Moorestown, N. J., have reported on the effect of winter on larval populations of the Japanese beetle. A survey indicated a high mortality in certain parts of the southern half of New Jersey. In Burlington County an average of 54 percent of the larvae were dead, and in Atlantic County 29 percent were dead. The mortality varied greatly in the different fields. In one field not a single living larva could be found. At two regular survey stations in the vicinity of Moorestown the mortalities were 73 and 80 percent. In 35 surveys in Ocean County 85 percent of the larvae were dead, but the beetle population is relatively low in these counties. In surveys made in southwestern New Jersey (Cumberland County), an area that has for several years had a high beetle population, mortality of about 25 percent is indicated in pastures and about 30 percent in cultivated fields. In the northern half of New Jersey at 3 sites in Middlesex County the mortalities were only 1, 6, and 9 percent. In the suburban sections north of Philadelphia in eastern Pennsylvania, an average mortality of only 6 percent is indicated. At one point south of Philadelphia, however, 81 percent of the larvae found in 50 surveys were dead. The mortality observed in southern New Jersey is much greater than usual. In a series of studies of the soil population carried on in the years 1930 to 1934, inclusive, it was found that there was an average reduction of only 2 percent among the overwintering larvae between November 15 and April 15. In January and February of 1936, however, there was a prolonged cold spell, during which soil temperatures were unusually low. The larvae usually pass the winter at depths of from 4 to 8 inches, but at times they are found deeper in the soil. Occasional dead larvae have been found during March at depths of 12 inches, and at even lower depths larvae of native scarabaeids (Phyllophaga and Cotinis) were also killed. A study of United States Weather Bureau data on the snow cover during the low-temperature period, which was continuous from January 23 throughout February, indicates that in a considerable part of southern New Jersey, below the latitude of Trenton, the snow cover ranged from 1 to 4 inches, whereas in the northern half of the State there was, as a rule, from 5 to 9 inches of snow on the ground. The insulating effect of a snow cover is well known, and apparently its presence or absence has been the main factor in determining the survival or kill of larvae. The types of precipitation in the northern and southern sections of New Jersey differed during this period. In the southern section on January 19 this took the form of sleet that fused to make a coating of ice, while farther north the covering consisted of snow. This difference probably influenced the soil temperatures and the mortality.

Ants as predators of Japanese beetle and its parasites.--R. T. White, Moorestown, has completed a study to determine the status of ants as predators of the Japanese beetle and its parasites. Representatives of 12 genera, including 23 species of the more common ants in the generally infested Japanese beetle area, were used in insectary experiments and field studies. Comparative data from field surveys in areas infested with ants and from corresponding areas where ants were not present, show very little difference in relative grub populations. Numerous insectary experiments to determine any relationship between ants and Japanese beetles indicate little, if any, intentional harm by the 23 species of ants used in the experiments to the egg or any of the subsequent stages of the beetle. Experiments using various formicid species and Tiphia cocoons in the soil show that only one species, Solenopsis molesta Say, consistently damaged the cocoons of this parasite. Cocoons riddled by S. molesta have been found in the field, as well as in the insectary plots. The study fails to show that ants have any appreciable deleterious effect upon the Japanese beetle or its parasites.

MEXICAN FRUIT FLY CONTROL

Fruit fly control in lower Rio Grande Valley.--The harvesting period for the 1935-36 citrus crop closed on March 31. Little fruit remained in the groves or packing houses at the close of the season, and all the marketable fruit was packed before the host-free period began. Thirty-eight adult Anastrepha ludens Loew were trapped in the valley, 1 in northern Hidalgo County, and 5 in Brooks County. The number of adults trapped in the valley decreased from 83 during February to 38 during March. This decrease was expected, as adults apparently leave the area when the fruit is harvested.

FRUIT FLY INVESTIGATIONS

Activity of female flies.--Oviposition studies in Mexico on Anastrepha serpentina Wied. by W. E. Stone, Mexico City, show that females may be active as long as 112 days before beginning to lay. Presence of females in the field without eggs during the winter season may therefore be expected.

DATE SCALE CONTROL

Progress in scale control.--Scouting was continued in the Coachella Valley and 117 unlisted palms were found. Most of these were newly planted offshoots, the others small volunteer palms. A final check-up of fan palms was begun in the infested area. Pruning of bushy palms, difficult to inspect, was begun in the Imperial Valley. This is preliminary to the final inspection. Leaf bases were removed from 24 previously infested palms to eliminate the possibility of infestations beneath the fiber.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Seasonal hatching and growth of grasshoppers in California.--C. C. Wilson, of the Sacramento, Calif., laboratory, reports as follows: "Eggs of Melanoplus mexicanus Sauss. were first noted hatching on February 8 and they continued to hatch until March 11 in Imperial County, with the maximum hatch occurring on March 6. These facts were obtained by cooperation with B. A. Harrigan, agricultural commissioner of Imperial County. On March 12 Thomas Chalmers, agricultural commissioner of San Luis Obispo County, noted the first hatching of Camnula pellucida Scudd. and Oedaleonotus enigma Scudd. in his county. On March 27 the nymphs on the egg beds of an area in this county selected for intensive study ranged in numbers from 1 to 500 per square foot and in size from first to third instars. Eighty-five percent of the eggs were hatched on the south slopes of the ranges in contrast to none on the north slopes. Eye spots were not visible in the eggs on the north slopes. In the Antelope Valley of Los Angeles County M. mexicanus eggs were unhatched in alfalfa fields near the end of March but those of O. enigma were hatched and the individuals ranged in size from first to third instars in the grazing lands on the west side of the valley."

Winter mortality of European corn borer.--A. M. Vance, of the Toledo, Ohio, laboratory, reports that no evidence of a pronounced lethal effect on corn borer larvae from the low temperatures of the past winter has appeared in any localities where observations have been made to date--in Toledo, Ohio, Lenawee County, Mich., New Haven and Hartford Counties, Conn., and Monmouth and Ocean Counties, N. J. On the contrary, a lower mortality rate is indicated than that found in March 1934. D. W. Jones found no winter mortality on the Eastern Shore of Virginia up to March 9. Since that date mortalities as high as 4 percent have been noted in some of the more heavily infested fields.

Winter mortality of hessian fly in Kansas and Missouri.--E. T. Jones, of the Manhattan, Kans., laboratory, reports that in southeastern Kansas and southwestern Missouri several fields observed last fall to be severely injured by hessian fly appeared to have recovered from injury by March 14. Dissections of flaxseed collected on that date from 3 localities and in Manhattan on March 24 indicate comparatively high winter mortality and show population to be well advanced. The results of these dissections are shown in the following table.

Locality	Condition of fly	
	Dead	Pupated
	Percent	Percent
Missouri:		
Carthage	16	28
Springfield	20	62
Kansas:		
Parsons	12	30
Manhattan	16	24

Control of sugarcane borer by flooding.--J. W. Ingram and H. A. Jaynes report from Florida as follows: "For the past several years officials of the Fellsmere Sugar Company have practiced flooding their stubble annually as a borer control measure during the period from January to March, or immediately following the harvesting of the cane crop. The stubble was flooded for at least 72 hours. Prior to the adoption of this practice by the president of this company, losses from borers were heavy, but following this practice there has been a marked reduction in borer injury. This period of flooding has apparently not affected the stand of cane coming from the flooded stubble. Examinations to determine the effectiveness of flooding from the standpoint of larval mortality were made on January 27 and 28. The fields had been flooded for 85 hours beginning on January 10. Prior to flooding, the trash had been burned. Check fields had been neither flooded nor burned. Eighty-nine percent of the borer stages in the trash were dead in the area that had been burned and flooded, as compared to 19 percent in the untreated trash. It appears that flooding stubble to control borers is a very profitable practice at Fellsmere, especially as little cost is involved because of gravity flooding and drainage."

Parasites of the sugarcane borer.--Messrs. Ingram and Jaynes also state that in searching for a supply of borers for use in parasite-introduction work, Pennock Plantation, having 18 acres of cane, at Jupiter, Fla., about 19 miles north of West Palm Beach, was visited. In examining sugarcane there, 13 empty and 8 unemerged puparia of a parasitic fly were found in borer tunnels. Parasitization was estimated to be from 30 to 40 percent. This material was determined by C. T. Greene and D. G. Hall, Washington, D. C., as Theresia claripalpis v. d. W. The cane was cut in small lots at intervals for use as cattle feed, resulting in a continuous supply of young and old cane for borers and their parasites.

Eggs of stored cereal insects resistant to fumigants.--According to R. T. Cotton, Geo. B. Wagner, and H. D. Young, Manhattan, Kans., laboratory tests indicate that eggs of the flour beetle and flour moth are highly resistant to the fumes of chloropicrin. A 1-hour exposure to a saturated atmosphere failed to give a perfect kill. A dosage of 4.14 pounds per 1,000 cubic feet of space was required to kill eggs of the flour moth in 24 hours, and a dosage of 6.2 pounds per 1,000 gave only 63-percent kill of flour moth eggs. These results indicate that flour-mill and atmospheric-vault fumigations with chloropicrin cannot be as satisfactory as has been supposed. Carbon disulphide does not kill eggs of the flour moth and flour beetle in low concentrations for short exposures, a dosage of 23.4 pounds per 1,000 cubic feet of space for a 3-hour period being required. The saturated atmosphere of ethylene dichloride failed to kill eggs of these species in 1 hour, although for a 24-hour exposure a dosage of 2.34 pounds and a dosage of 3.12 pounds per 1,000 cubic feet of space, respectively, gave 100-percent kill of the eggs of the flour moth and the flour beetle.

Temperatures experienced by hibernating chinch bugs in Kansas.--W. T. Emery, Manhattan, reports that the temperatures to which hibernating chinch bugs were subjected last winter were determined by means of thermocouples imbedded in clumps of Andropogon sod, one being located well down in the crown of a clump of A. furcatus and another on top of the crown of a clump of A. scoparius. Temperatures were recorded daily about 8 a. m. and 2 p. m. Each clump of sod was protected by a good tuft of grass and during January and February 1 or 2 inches of snow afforded additional protection. Daily air temperatures were recorded by a thermograph. Temperatures in the lower part of the crown level never reached the thermal death point, whereas temperatures in the upper crown level dropped to or below the thermal death point 19 times and once reached the lowest thermal death range. The air temperatures went below the upper thermal death range 35 times and 27 times below the lower thermal death range. According to counts of living chinch bugs that survived the winter, the mortality ranged between 40 and 50 percent.

JAPANESE BEETLE CONTROL

Autogiro purchased for Dutch elm disease scouting.--Delivery was accepted on March 14 of a two-seated PA-18, 1933 autogiro, which will be used in preliminary observations for wilting characteristic of Dutch elm disease attack. In this way speedy coverage may be made of territory that cannot be immediately reached by field scouts. Last summer members of the permanent staff made several observation trips both in an autogiro and in an airplane. Aerial observations were found to have considerable possibilities in determining concentrations of the disease and in spotting dead and dying elms that might harbor the disease or furnish breeding places for insect carriers. Autogiro scouting of the various railroad routes over which imported burl elm logs traveled en route to veneer factories in the Middle West is planned. Spot photographs of suspected areas may be made. Inquiries are being made concerning existing aerial photographic maps of the Dutch elm disease area with a view to procuring them for use of the ground scouts and in observations from the air. The original price of the autogiro was $6,750 and although it had been flown only 67 hours, it was obtained for the approximate price of three 1½-ton trucks.

Clear-cutting completed in one swamp area.--Clear-cutting work in area 1 of the Great Piece Meadow, Essex County, N. J., was completed during the week of March 7. Eradications in this area totaled 54,269 elms, from which 601 confirmed trees were determined. Great Piece Meadow comprises areas 1, 2, and 4 in Essex County and area 8 in Morris County.

Dutch elm disease personnel.--Personnel engaged in Dutch elm disease activities at the end of March numbered 3,157 W. P. A. workers, 58 appointees, 5 per diem men on regular funds, 805 C. C. C. enrollees, 21 men from transit camps, and 44 State men, a total of 4,090.

Infested cordwood intercepted.--On March 17 road inspectors stationed at South Glastonbury, Conn., on the border of the generally infested gypsy moth area, intercepted a truck load of cordwood en route from a private estate at Wolfeboro, N. H., to a residence in New York City. Examination of the wood disclosed one new gypsy moth egg mass and four old egg clusters. Neither the owner of the wood nor his driver had any knowledge of the quarantine regulations. It being learned that cordwood was transported to New York City from the Wolfeboro section in 1935, details of the interception were referred to the New York State Department of Conservation so that surveys might be made in the vicinity of the New York residence to determine whether infestation had been spread on the wood.

Flood waters may spread gypsy moth infestation.--With the flood waters of the Connecticut River carrying seaward large quantities of trees, branches, logs, posts, lumber, pulpwood, and debris, the speculation is raised as to the possibility of gypsy moth infested forest products being scattered over large areas of farmlands in the lightly infested section of Middlesex County, Conn., or of being carried south along the Atlantic coast.

Provisions for treating beetle infestations in St. Louis, Mo., and Greenville, S. C.--Advices have been received from J. Carl Dawson, Plant Officer of the Missouri Department of Agriculture, that approval has been received of a State W. P. A. project for combined lead arsenate treating and intensive trapping of the Japanese beetle infested section of St. Louis. Estimated expenditures total $70,570, with contributions of $42,482 from W. P. A. funds and $28,088 by the Missouri Department of Agriculture. Relief funds will be used for the purchase of one-half of the 60 tons of lead to be used, for labor, and for the hiring of motor trucks. State contributions provide for spray tanks and their operation, certain other equipment, an additional 30 tons of lead arsenate, and supervision of the treating. In South Carolina $1,600 of State funds are available for treating approximately 16 acres in the infested section of Greenville.

Private life of ants, crickets, and spiders demonstrated in novelty specialty.--An inquiry from an individual in Hanover, N. H., revealed an interesting, new business in ant, cricket, and spider houses, the manufacture of which has been patented. The manufacturer reports a growing demand for these novelties, with many orders coming from hospitals, schools, and similar institutions. Since each shipment involves a quantity of soil, arrangements have been made for Japanese beetle quarantine certification.

Floods interfere with establishment of road posts.--A Japanese beetle road-patrol supervisor driving a light delivery truck and a driver with a 1½-ton truck experienced considerable difficulty while engaged in setting up road inspection stations preparatory to the assignment of inspectors to the posts. The muddy condition of several Virginia highways made it impossible to transport the booths on the automobile chassis dolly usually employed, so it was necessary to unbolt and dismantle the booths and load them aboard the truck to move to their new sites in the vicinity of Culpeper. A booth had been equipped and replaced near the Harpers Ferry, W. Va., bridge a few days before the Potomac River swept over the bridge and destroyed many structures in its path. Later the two men were marooned in a city in western Pennsylvania and found it necessary to drive 400 miles to reach Harrisburg, 200 miles distant.

Survey growers in newly regulated area.--Survey work progressed rapidly among growers and dealers in sections that were added to the Japanese beetle regulated area with the revision effective March 16. In Tompkins County, N. Y., most of the newly added establishments are small and do a local business. The survey has been completed in the few election districts added in Maryland. This work has also been finished in the Richmond, Va., district and most of the firms contacted requested that their establishments be classified. Increased inspections and bad roads in the rural sections surrounding Washington, D. C., prevented completion of the survey there. It is expected that about 50 classified establishments will be added in the tier of counties taken under regulation in northeastern Virginia.

Warm spell speeds nursery shipments.--With the arrival of typical spring weather late in March, nurserymen were forced to speed their operations to the limit. Higher temperatures forced open the buds so rapidly that nurserymen were apprehensive as to whether they would be able to complete the orders on hand for spring delivery. Most of the nurseries added extra help, as the customers demanded immediate shipment of their stock. Inspectors were obliged to closely schedule their calls in order to meet inspection demands. Two temporary employees were added to the inspection force at one of the principal nurseries in the Philadelphia area.

New locations for road-patrol stations.--Enlargement of the northern Virginia Japanese beetle regulated area added one highway to the number of important exits that must be guarded. The new Virginia road stations will be located on U. S. Route 50; 2½ miles west of Paris, at the Shenandoah River; on U. S. Route 211, ½ mile east of Amissville; and on U. S. Highway 15, between Culpeper and Madison Mills. Frost heaving of the macadam has left routes 15 and 50 in bad condition. During the effective period of the summer quarantine on fruits and vegetables, an additional post will be operated on Virginia Route 7, between Purcellville and Berryville on the west side of the Blue Ridge Mountains.

FOREST INSECT INVESTIGATIONS

Weevils a problem in acorns for Shelterbelt plantings.--N. D. Wygant, of the Fort Collins, Colo., laboratory, reports that insects affecting forest-tree seeds are becoming problems where seeds are needed in such large quantities as for the Shelterbelt project. Bur oak and post oak acorns were collected during the fall of 1935 in Kansas, Oklahoma, and Nebraska in large quantities for planting in shelterbelt strips and nurseries. Seventy-five percent of the acorns contained weevil larvae when collected. In some localities the acorns were so badly weeviled that they were not worth collecting.

Flatheaded borer damages honeylocust in Shelterbelt.--J. A. Beal, Fort Collins, reports that honeylocust (Gleditsia tricanthos L.), a tree widely used in early windbreak plantings and in the new plantings because of its supposed immunity to insect injury, has, during the past summer, been heavily attacked and killed in many plantings by a flatheaded borer, Agrilus difficilis Gory. Many of these trees in the older shelterbelts have been making good growth during the past 15 to 20 years, but it appears that the effects of the prolonged drought have so weakened them that they have fallen easy prey to the borers. This belief is borne out by the fact that heavy irrigation of some of the infested trees at Woodward, Okla., at the time when attack was first observed, reinvigorated many of them sufficiently to repel the insect attack.

Tree-ring calendar.--The ancient climatic history of eastern Oregon is gradually being revealed through a study of ponderosa pine growth rings being made by F. P. Keen, of the Portland, Oreg., laboratory. The effects of catastrophies such as forest fires, floods, insect defoliations, and drought periods are all recorded in these tree rings. The study was started in 1923 in an effort to determine the relation of drought to western pine beetle epidemics and has been given increased attention this year. With the help of two W. P. A. computers, radial sections from the stumps of 213 freshly cut ponderosa pines on four widely separated areas have been measured ring by ring to the nearest 100th millimeter. All measurements have been adjusted for age, diameter, and normal rate of the trees. This alone involved over 50,000 percentage computations. The pattern of growth fluctuations has been found to be uniform over all southeastern Oregon and northeastern California and has been traced back for 600 years. The results of the study, the first comprehensive one of its kind in the Pacific Northwest, should be available within the next few months and undoubtedly will be of much interest, not only to forest entomologists, but to foresters, agriculturists, meteorologists, and all concerned with the periodicity of floods and drought.

Megastigmus pinus Parf. destructive to Shasta fir seeds.--R. L. Furniss, Portland, reports that a collection of 13,000 seeds of Shasta fir (Abies magnifica var. shastensis) was made in September 1935, near Lake of the Woods, Oreg., by members of the Pacific Northwest Forest Experiment Station. These seeds were kept in a tin container until March 1936, when it was found that they were so badly riddled by insects that the lot had to be discarded. Examination of a 2-percent sample of the seeds on March 18 showed 56 percent sterile, 41 percent ruined by insects, and 3 percent sound. Practically all of the insect-infested seeds were attacked by M. pinus. Two percent of the seed chalcids were parasitized.

Effects of defoliation of ponderosa pine.--J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, reports on the results of a study made in connection with an epidemic of the pine butterfly (Neophasia menapia Felder) which occurred in the vicinity of Payette Lakes, Idaho, in 1921. During this outbreak, which continued through 1923, when it was brought under complete control by natural factors, large areas of ponderosa pine were severely defoliated. A sample plot was established near New Meadows in 1924 for the purpose of obtaining data relative to the actual after effects of such defoliation. Annual examinations were made of the trees within this plot from 1924 to 1930, and in 1933 and 1935. Data obtained in these examinatins show that 12 percent of the trees died as a direct result of defoliation and that 14 percent were attacked and killed by western pine beetles. It is also believed that some of the trees killed by beetles were so severely weakened by the injury that they would have died from the effects of defoliation alone. In addition to the actual destruction of trees there was a material reduction in the basal growth rate of those still living in 1935. During the period of this study, the increased basal diameter of the trees that survived the injury was about 60 percent of the growth during a comparable period prior to defoliation.

Relation of low temperature to mortality of overwintering broods of the mountain pine beetle.--Mr. Evenden also reports that in the fall of 1935 arrangements were made to obtain daily temperature records from two C. C. C. camps located adjacent to infestations of the mountain pine beetle in lodgepole pine. Following the low temperatures of last February, T. T. Terrell and A. L. Gibson obtained samples from four infested areas in Montana. Blocks of wood with approximately 1/2 square foot of bark surface were taken from the north and south sides of each tree at a 5-foot interval, and at 1 foot above the ground in areas where the snow was of such depth as to indicate a protection to this portion of the tree. In one area a few samples were obtained at a height of 17 feet. Samples were taken from 25 trees. It was found that a very high mortality had occurred. At the 5-foot interval this was approximately 98 percent for all trees. At 1-foot and 15-foot heights there were a few living insects. This mortality was associated with a low minimum temperature of -35° and a maximum temperature of -15° at one of the C. C. C. camps and a minimum of -15° and a maximum of -1° at the other. Detailed records from adjacent Weather Bureau stations have not yet been received. The trees from which these samples were taken will be reexamined in June to check the condition of the brood just prior to emergence. The association of this mortality with the February temperatures is not too positive a conclusion. In October 1935 a sudden freeze caused severe damage to plant life throughout the Northern Rocky Mountain region. Ponderosa pine foliage was killed, unpicked apples were ruined, and many cherry trees were destroyed. The possibility of this sudden and abnormal freeze playing an important role in the subsequent mortality of overwintering broods of bark beetles must be recognized.

Larval development of European spruce sawfly.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports that a second generation of European spruce sawfly larvae, reared in the laboratory, spun their cocoons from 23 to 25 days after hatching. The period of larval development checks closely with that of the previous generation. The information obtained this winter will materially aid in the progress of life-history investigations to be undertaken this year.

Recent findings in New York.--J. V. Schaffner, Jr., and P. A. Perry, New Haven, report the finding of a light infestation of Cryptococcus fagi Barensp. at Roslyn, L. I., N. Y., and the second recovery of Tetrastichus turionum Htg. from Rhyacionia buoliana Schiff. at Matinecock, L. I.

Parasites of tent caterpillar in Minnesota.--P. B. Dowden, New Haven, reports that three species of egg parasites have issued from egg masses of the forest tent caterpillar (Malacosoma disstria Hbn.) received from the

Chippewa National Forest in February. They have been tentatively determined, subject to confirmation by the National Museum, as Telenomus clisiocampae Ashm., Tetrastichus malacosomae Gir., and Ooencyrtus clisiocampae Ashm., all of which occur in New England.

Larch sawfly parasites.--Mr. Dowden also reports issuance of four species of parasites (3 hymenopterons and 1 tachinid) from cocoons of Nematus ericksonii Htg. collected at the Flathead National Forest in Montana by J. C. Evenden and from several points in Wisconsin, Minnesota, and Michigan by L. W. Orr. Apparently all of these parasites are common to both regioms, but they have not yet been specifically determined.

Another Dutch elm disease carrier convicted.--W. D. Buchanan, of the Morristown, N. J., laboratory, reports that the Dutch elm disease fungus (Ceratostomella ulmi (Schwarz) Buisman), has been isolated for the first time from adults of an introduced ambrosia beetle, Xylosandrus germanus Bldfd., which issued from an elm log infected with the fungus. R. R. Whitten, of the same laboratory, reports that the fungus has been isolated from adults of a histerid beetle, Platysoma coarctatum Lec., removed from galleries of Scolytus multistriatus Marsh. in elm.

PLANT DISEASE CONTROL

Barberry eradication.--Expansion of field work in barberry eradication during the latter part of March and the first part of April has been somewhat retarded by weather conditions in the Middle West. On April 15, however, there were 2,600 men at work. Some expansion had been made in 15 of the 17 States that are conducting stem rust control activities with emergency funds. A recent report from L. K. Wright, in charge of eradication work in Pennsylvania, states: "It is estimated that in 1936 there will be an increase of 15 percent over the past 10-year average in the acreage of oats planted in northeastern Lackawanna and southeastern Susquehanna Counties in an area where 150 square miles have been cleared of barberry bushes. During the past 10 years numerous farmers in this area have completely abandoned growing oats because of repeated failures due to stem rust." L. M. Ames, who spent a portion of his time during the past winter in taxonomic studies of the Berberidaceae, makes the following comment: "The best key for the identification of barberries is contained in 'Cultivated Trees and Shrubs' by Rehder. About 75 species are described. The Arnold Arboretum contains more than 240 species of Berberis and about 75 species of Mahonia. In view of the large number of species in the herbarium which are not included in Rehder's manual, as well as the numerous species not represented in the herbarium, it appears desirable to prepare a more inclusive key which will include at least the species represented in the herbarium. Two hundred and fourteen species have now been keyed out and already there have been many occasions to use the added information in making determinations of specimens sent in for identification."

Blister rust control program in sugar pine region.--Field operations in California for 1936 will consist of 23 75-man eradication camps, distributed as follows: Plumas National Forest, 6 camps--all in Plumas County; Eldorado National Forest, 5 camps--all in Eldorado County; Stanislaus

National Forest, 6 camps--1 camp in Calaveras County, 3 in Tuolumne County, and 2 in Mariposa County; Sierra National Forest, 6 camps--4 in Mariposa County and 2 in Merced County. In Oregon field operations will consist of 7 66-man camps in the Rogue River National Forest, 4 of these camps being located in Josephine County and 3 in Klamath County. From contacts with the W. P. A. and National Reemployment Service offices in San Francisco, it appears that we shall have no difficulty in filling our labor requisitions. A large proportion of laborers will probably be obtained from W. P. A. transient camps, as was the case in 1935. We plan to begin field operations just as early in the spring as weather and growing conditions (Ribes leaf conditions) will permit, and it seems probable that the first camps can open in the latter part of April.

Results of pine- and control-area mapping in Northeastern States.--Since the close of the Ribes-eradication season in October 1935, pine- and control-area mapping, which is an essential part of blister rust control, has been the major field project in connection with blister rust control activities in the Northeastern States. This work has been conducted in all the States in this region, except New Jersey. During the 4-month period, November 1 to February 29, a total of 1,129,779 acres were mapped, and an additional 1,734,448 acres were examined and eliminated owing to lack of sufficient pine to justify the cost of Ribes-eradication work. A total of 3,781 miles of control-area boundary lines were marked in the field. This fall and winter work required 29,632 man-days of labor and gave much-needed employment to men obtained from relief rolls.

Blister rust nursery sanitation in Southern Appalachian States.--In the Southern Appalachian States, 9 white-pine growing nurseries and their environs were examined for Ribes during the month of March--5 in Maryland, 3 in Virginia, and 1 in West Virginia. The only nursery in this region where crew eradication will be necessary is located at Parsons, W. Va., where work will be started about April 15.

COTTON INSECT INVESTIGATIONS

Boll weevil survival for 1936.--R. C. Gaines and associates, Tallulah, La., and F. F. Bondy, Florence, S. C., report that the annual spring examinations of Spanish moss to determine the boll weevil survival were made at Tallulah and at Florence from March 2 to 20. Representative samples from woods near infested fields were taken at both places. No live boll weevils were found in the moss this spring. This is the first time since 1926 and the second time in the 21 years at Tallulah and 8 years at Florence in which examinations have been made that no live weevils were found in the spring moss examination. Samples of trash from under timber and brush, consisting of leafage debris, and all material on the surface of the ground were also examined for hibernating weevils at both localities. At Tallulah trash collected from the edge of infested fields and at varying distances up to more than 200 feet in the woods, contained live weevils at the rate of 141 per acre. None of the weevils were found in samples taken more than 100 feet from fields. All of the weevils were in samples of leafage, none being found in pine straw or grass and weeds. At Florence trash was examined from soil collected in woods within 150 feet of infested fields and found to contain live weevils at the rate of 181 per acre. Records of the number of weevils found at varying distances from fields at Florence are not available. Since the dead weevils disintegrate and are difficult to find, the number found probably represents only a small proportion of those present and is not an accurate indication of the mortality. From general observation it appears that where the timberline is more dense and where Spanish moss is present more weevils are found in the ground litter. The activity of weevils in hibernation cages was much less than usual this winter at Tallulah and Florence, but about normal at College Station, Tex. Fewer weevils were taken on the flight screens at Tallulah during the winter than ever before. Fewer weevils than normal entered hibernation last fall at Tallulah and Florence and indications are that the survival at these places will be the lowest on record. At College Station about an average survival is indicated.

Boll weevil field-plot control tests in Mississippi in 1935.--H. C. Young, State College, Miss., summarizes a report on boll weevil control tests conducted at State College and Hattiesburg, Miss., during 1935, as follows: (1) In 5 comparable tests, one presquare application of calcium arsenate dust, not followed by later treatments, gave an average gain of 25 pounds of seed cotton per acre and an average profit of $0.74; and regular calcium arsenate dusting gave an average gain of 48 pounds of seed cotton per acre and an average loss of $0.79. (2) In 5 tests, one presquare application of calcium arsenate dust followed by later applications of calcium arsenate after 10 percent infestation gave an average gain of 144 pounds of seed cotton per acre and an average profit of $2.47; and regular calcium arsenate dusting gave an average gain of 122 pounds per acre and an average profit of $2.21. (3). In 5 tests, one presquare application of calcium arsenate dust followed by two applications of calcium arsenate at weevil-migration time gave an average gain of 46 pounds of seed cotton per acre and an average profit of $0.52; and regular calcium arsenate dusting gave an average gain of 130 pounds per acre and an average profit of $2.44. (4) In 4 tests, two applications of calcium arsenate at migration gave an average gain of 38 pounds of seed cotton per acre and an average profit of $0.40; and regular calcium arsenate dusting gave an average gain of 81 pounds per acre and an average profit of $1.15. (5) In 2 tests, three applications of calcium arsenate after 10-percent infestation gave an average gain of 69 pounds of seed cotton per acre and an average profit of $1.63; and regular calcium arsenate dusting gave an average gain of 231 pounds per acre and an average profit of $7.08. (6) In 3 tests, dusting with 50-percent calcium arsenate and 50-percent lime mixture gave an average gain of 54 pounds of seed cotton per acre and an average profit of $0.88; and regular calcium arsenate dusting gave an average gain of 97 pounds per acre and an average profit of $1.97. (7) In the 14 tests at State College, regular calcium arsenate dusting gave an average gain of 109 pounds of seed cotton per acre and an average profit of $2.44. (8) In the 10 tests at Hattiesburg, regular calcium arsenate dusting gave an average gain of 98 pounds of seed cotton per acre and an average profit of $1.12. (9) In 24 tests, regular calcium arsenate dusting gave an average gain of 105 pounds of seed cotton per acre and an average profit of $1.89. (10) Only 1 method, one presquare application of calcium arsenate followed by later applications of calcium arsenate after 10 percent infestation, gave greater gain and larger profit than regular calcium arsenate dusting.

Presquare dusting for boll weevil in plots and fields.--During 1935 a series of tests was conducted by Mr. Young in Mississippi to determine whether presquare poisoning would give better weevil control when applied to an entire field than when applied to plots. The plots used ranged from 24 to 30 rows in width and from 300 to 500 feet in length. The area of the plots ranged from 0.54 acre to 1.09 acres, averaging 0.84 acre. The fields ranged in area from 4 to 9 acres, averaging 6.75 acres. The infestation in each field and plot was determined before treatment and at weekly intervals thereafter throughout the season. The infestation in the plots treated with one presquare application of calcium arsenate dust increased as rapidly as in the adjoining untreated plots. The infestation was considerably less in the treated fields after the poison application than in the surrounding untreated areas during every week throughout the season. Six weeks after treatment the infestation in the treated fields was delayed about 1 week in reaching a given point, as compared to the untreated fields, whereas there was no difference in the infestation of the treated and untreated plots.

Boll weevil parasites in South Atlantic States in 1935.--F. F. Bondy and C. F. Rainwater, Florence, S. C., reporting on boll weevil parasites and other insects reared from cotton squares during the summer of 1935, state that although 111,467 squares were caged, only 50,303 were actually productive of either boll weevils or boll weevil parasites. The number and species of parasites obtained were as follows:

Species	Virginia	North Carolina	South Carolina	Georgia	Florida	Total
Microbracon mellitor Say	74	671	648	626	13	2,032
Eurytoma tylodermatis Ashm.	--	35	72	196	--	303
Catolaccus hunteri Cwfd.	1	21	51	22	--	95
Zatropis incertus Ashm.	4	14	46	24	1	89
Triaspis curculionis Fitch	--	17	17	2	--	36
Eupelmus cyaniceps amicus Gir.	--	2	14	4	--	20
Myiophasia globosa Towns.	--	31	29	7	2	69
Triaspis curculionis var. rufus	10	18	2	--	--	30
Microbracon n. sp.	2	1	--	--	--	3
Tetrastichus hunteri Cwfd.	1	--	--	1	--	2
Microdontomerus anthonomi Cwfd.	--	--	--	2	--	2
Total	92	810	879	884	16	2,681
Percentage of parasitization in productive squares	4.2	6.4	5.1	5	2.7	5.32

All of the boll weevil parasites reared are hymenopterons, except the dipteron M. globosa. The percentage of boll weevil parasitization was found to vary considerably during the season in each of the States from which representative collections were made. Squares collected from some localities in each State were found to be consistently high in parasitization whereas squares from other localities were consistently low. Practically all of the squares collected were "fallen" squares, that is, squares that had been punctured by the boll weevil and had dropped from the plants. A large number of Hymenoptera and Diptera other than the known boll weevil parasites were also reared from the caged squares.

Notes on Heliothis obsoleta Fab. at Brownsville, Tex.--T. C. Barber and P. A. Glick report that the bollworm was found quite frequently in corn ears during January, although it was not observed on cotton during the winter months. On corn it was present in all stages, from minute to fully developed larvae. The corn was planted late in the fall for the winter crop, therefore the presence of the worms in the ears alone is sufficient to prove that the species is breeding under winter conditions. A number of larvae were collected in January and were placed in the insectary, some on corn and others on cotton bolls, to which they transferred readily. These larvae pupated during the middle of February and several emerged on March 16, 19, and 24. The first moths were also seen in fields of young corn on March 16, and numbers were taken at night around lights. A large emergence was evident at this time, as hundreds of moths could be found on the young corn plants and at lights. Alfalfa, beans, and other plants were examined, but no eggs or larvae were found. As it was not advisable to pull the corn apart to examine the blades for eggs, counts were made of larval infestation of H. obsoleta. A total of 25,200 seedling corn plants were examined between March 19 and 23 and 379 larvae and 47 moths of H. obsoleta were collected. Larvae were found on 1.12 percent and moths on 0.14 percent of the seedling plants.

Insects on cotton during the winter at Brownsville.--Beginning in January, Messrs. Barber and Glick made systematic sweepings of cotton plants at Brownsville with a hand net. During January they collected an average of 25.93 insects per 100 strokes; during February, 31.75 insects per 100 strokes; and during March, 67 insects per 100 strokes. Altogether, 3,094 insects were taken in 6,800 net strokes during this period. The most numerous species was the boll weevil, of which 612 were collected, or 9 weevils per 100 strokes. During February, 14 weevils were taken per 100 strokes, but they decreased rapidly during March and less than 5 per 100 strokes were collected. During January and February the immature stages of the boll weevil were also much more abundant than during March, probably due to the reduced number of bolls and squares during the latter month. Although January 1936 was the coldest January in the past 6 years and February the second coldest recorded in 54 years at Brownsville, and although insects were therefore probably less active and less abundant than during normal winters, the boll weevil apparently continued breeding as long as squares or bolls were available for oviposition. As the weevils in the Brownsville area are active during the entire winter and apparently become even more active in the spring, probably most of them die before the new crop develops enough to afford oviposition places. The cotton aphid (Aphis gossypii Glov.) was found on cotton during all of the winter months and some parasitization was noted. The cotton leaf perforator (Bucculatrix thurberiella Busck) was observed throughout the winter. Adults were collected in January, and larvae and pupae were found on the cotton plants each month. Two larvae, collected in January, pupated during the first week of February and the adults emerged on February 28 and 29. A larva that pupated on February 13 emerged on March 5 and another collected on February 5 pupated on February 15 and the adult emerged on March 7. Among the 3,094 insects collected and recorded were representatives of 12 orders, several dozen families, and several hundred species. The cotton leaf worm (Alabama argillacea Hbn.) was not collected, although old, empty pupal cases showed that this species had been present in the fall. The flea hopper (Psallus seriatus Reut.) was not collected on cotton and was not observed until March 23, when adults were collected on horsemint (Monarda critidora).

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Trap-plot cotton in the Big Bend.--There was considerable activity in the Big Bend area of Texas in March in preparation for trap plots of cotton this coming season. The farmers have prepared the land and the plots were planted during the latter half of March. These plots constitute one of the special control measures used in this area for the past several years to reduce the pink bollworm infestation and also the danger of its spread to other areas. Since the plots were planted the weather has been unusually cold and, as some of the cotton was just coming up, some damage is possible. A total of 10 plots has been planted, 2 in the Castolon section of Brewster County and 8 in the Presidio section of Presidio County. The other two measures of the special control program are field clean-up in the fall and delayed planting of the cotton crop the following spring, so that the majority of moths will emerge before cotton is fruiting. A few farmers were anxious to begin planting, but the recent cool weather caused them to change their minds. Indications are that the delayed planting date of April 15 is going to be satisfactorily observed, as has been the case since the program has been in effect. The farmers will cultivate and take care of the trap plots until cotton begins fruiting, at which time inspectors of this project will collect the blooms daily and destroy them after the necessary inspections have been made.

Wild cotton eradication.--The eradication of wild cotton in southern Florida made much better progress in March than in February. This was due to more favorable weather conditions. A first clean-up was made on 36-3/4 acres, from which 994 mature and 2,362 seedling plants were removed. A recleaning was made on 12,632½ acres, from which 1,386 mature, 1,353,255 seedling, and 12,253 sprout plants were removed. Bolls are inspected from time to time during the clean-up, but no specimens of the pink bollworm have been found this season. This wild cotton was first found to be infested in the summer of 1932, and its eradication is being carried on to reduce the menace to the main Cotton Belt. In addition to the above acreage, a survey was made on 36,127 acres without finding any plants. The cotton occurs along the low-lying coastal section and adjacent islands of southern Florida, so that considerable acreage has to be gone over to be sure that no plants have been overlooked. The work this season is being carried on with W. P. A. funds and, as larger crews are being used, it has been possible to cover a much larger area than during previous seasons. Almost 1,200,000 of the seedling plants removed during the month were found on Boca Grande Key. This key was cleaned last year but rather late in the season, after the cotton had opened. The large number of seedling plants found this year indicates that a considerable number of seed had fallen to the ground. No mature plants were found and only 5 sprout plants.

Thurberia plant eradication.--The eradication of Thurberia plants in the mountains of southern Arizona, using W. P. A. funds, has continued to make satisfactory progress. Work is now being carried on in the Santa Catalinas, the second nearest range to cultivated cotton. The nearest range is the Tortillitas, which was completed in February. During March, 5,500 acres were covered, on which 40,310 plants were removed. Many of the plants are infested with the Thurberia weevil, and it is to remove this menace from cultivated cotton that the work is being carried on. The Santa Catalinas are considerably rougher than the Tortillitas, and plants have been found at elevations up to 5,600 feet. In some cases it is necessary to use ropes to lower men to plants on shelves. Just recently men were lowered from a 5,000-foot cliff to a shelf at 4,700 feet, where 71 plants were destroyed, and on another day 130 plants were destroyed at a 5,300-foot elevation. Notwithstanding the rough country, only a few minor accidents have occurred, as every precaution is taken to safeguard the laborers.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cryolite as effective as derris in control of Mexican bean beetle on lima beans.--In summarizing the results of the 1935 field-control experiments against Epilachna varivestis Muls., conducted at Mappsville, Va., L. W. Brannon, of the Norfolk, Va., laboratory, says: "In an experiment conducted on half-acre plots of Fordhook lima beans (using power machinery), in which cryolite spray (3-50), powdered derris root spray (0.025 percent rotenone), cryolite-talc dust (60-40), and derris-talc dust (0.22 percent rotenone) were compared, the results after six treatments showed that cryolite spray (3-50) was equally as effective as powdered derris root spray (0.025 percent rotenone), and that cryolite-talc dust (60-40) gave a considerably larger yield increase than derris-talc dust having a rotenone content of 0.22 percent. In comparing the yield increases at the time of the various pickings of this long-growing crop, there was an indication that powdered derris root spray failed to afford the residual effect obtained following applications of the cryolite spray. This has not been observed on the relatively short-growing snap-bean crop. The net profit per acre due to treatment was considerably greater from the application of cryolite spray than from the remainder of the material used in the experiment. This was due partly to the higher yield increase obtained with the material, but mainly to the decrease in the cost of treatment, as compared with that of the other treatments." In evaluating cryolite as an insecticide for the Mexican bean beetle, due consideration must be given to the possibility of harmful residue remaining on the harvested product if this insecticide is applied to the plants after the pods have begun to form.

Derris dusts impregnated with a spreading and wetting agent show increased efficiency against pea aphid.--T. E. Bronson, of the Madison, Wis., laboratory, reports that recent greenhouse tests have indicated that the efficiency of derris dust mixtures against the pea aphid (*Illinoia pisi* Kalt.) may be increased greatly by impregnating the dust mixtures with a commercially prepared sulphated alcohol known as sodium oleyl sulphate, special. Tests in which plants infested by the pea aphid were treated with various dust mixtures and placed in a chamber where the relative humidity remained at approximately 100 percent for a period of 16 hours after treatment, gave much more effective control of the pea aphid than in comparable tests in which the dusted plants were left in an open greenhouse. Derris dust mixtures containing 0.4 percent rotenone in which talc was used as the diluent, plus sodium oleyl sulphate as a conditioner, were more effective against the pea aphid in the course of experiments performed in the greenhouse than were derris dust mixtures in which kaolin or gypsum were used as the diluent, plus sodium oleyl sulphate as the conditioner, when the plants were left in the open. In instances where the treated plants were placed in a moist chamber, where a relative humidity of approximately 100 percent prevailed, no significant differences could be detected between the performance of each of the three dust mixtures in which different diluents were utilized. Better results were obtained with derris dust mixtures which contained a conditioner than with the unconditioned dusts.

Narcissus bulbs grown in Washington prove less tolerant to vapor treatment than those grown on Long Island.--According to a report by Randall Latta, of the Sumner, Wash., laboratory, parallel series of vapor-heat treatments for 4 hours at 118° F. of Long Island, N. Y., and Washington-grown narcissus bulbs of the varieties King Alfred and Glory of Sassenheim were made during the summer of 1935 in connection with sterilization tests of the bulb nematode (*Anguillulina dipsaci* (Kuhn) Jerv. & V. Ben.). In the forcing tests of these bulbs, those grown and treated at Babylon, Long Island, N. Y., produced better flowers than bulbs of the same stocks treated at Sumner, Wash. The bulbs grown at Sumner produced very few flowers and also had a poor top growth of foliage. The differences in the tolerance of the bulbs from the two localities is believed to be attributable to the hotter and drier summer seasons that prevail on Long Island.

Hibernation quarters of tobacco flea beetle.--As a result of studies to determine the overwintering quarters of the tobacco flea beetle, W. A. Shands, of the Oxford, N. C., laboratory, reports that the population of this insect in woodlands adjacent to tobacco fields was much greater than that in woodlands 135 yards distant. Also, that approximately 90 percent of the flea beetles overwintering, in the two locations studied, were present under the leaves and other forest litter in the first 10-yard strip along the edge of the woodland. As tobacco seed beds are ordinarily prepared along the edge of woodland areas, the information contained in these studies can be used to advantage in lessening the danger of direct flea beetle infestation of the plant beds.

Tobacco hornworm and budworm most abundant and destructive pests of tobacco in Georgia flue-cured district.--According to a summary of a survey conducted by F. S. Chamberlin, of the Quincy, Fla., laboratory, from May 16 to July 2, 1935, in the Georgia flue-cured tobacco district, *Phlegethontius sexta* Johan and *Heliothis virescens* Fab. were the most abundant and destructive insects to leaves of the growing tobacco plant, at least during the time when the survey was being conducted. The data also reveal that leaf injury by the tobacco budworm was much more prominent than that by the tobacco hornworm. Of the insects causing damage of lesser importance, the mole cricket (*Scapteriscus vicinus* Scudd.) and several species of cutworms and wireworms were apparently the most prevalent.

Lima bean pod borer causes heavy losses in southern California.--Rodney Cecil, of the Ventura, Calif., laboratory, reports that a recent survey of warehouses of 19 localities in the counties of Ventura, Orange, and San Diego, in southern California, disclosed an estimated loss of approximately $317,432.00 to the 1935 lima bean crop as a result of the damage caused by the lima bean pod borer (*Etiella zinckenella* Treit.). This survey involved data on a total of 807,190 100-pound sacks of lima beans. The estimated total loss included the percentage of beans which were actually damaged by the insect, as well as the increased cost of machine-cleaning and hand-picking operations incident to the removal of the damaged beans from the harvested crop.

INSECTS AFFECTING MAN AND ANIMALS

Technique for artificial rearing of screw worm fly.--Roy Melvin and Raymond Bushland, of the Dallas, Tex., laboratory, have developed a nutritional medium on which the larvae of the primary screw worm fly (*Cochliomyia americana* Cushing and Patton) can be reared successfully. Heretofore it has been necessary to keep a number of infested animals on hand in order to maintain a supply of the maggots for experimental purposes. This new method of rearing the larvae will be useful in promoting experimental investigations on the development of control measures against this species of screw worm fly.

How maggot excretions produce their healing effect.--Research on the ways by which the two elements, allantoin and Extract B, found in the excretions of surgical maggots promote healing shows that the typical effects are (1) a cleansing of the discharging wound by the removal of pus and dead malodorous tissues; (2) a reduction in the number and sometimes total disappearance of the bacteria which cause the disease; (3) stimulation of development of healing granulation tissue with abundant blood supply. Tests on the effect of these two extracts on cultures of bacteria occurring in the wounds show that neither of them can kill the bacteria direct. The destruction of the bacteria which does take place must therefore be a secondary or indirect effect of the extracts, such as a deterring or repellent action upon the bacteria by the healing granulation tissue forming in the wound. This vigorous growing tissue with abundant blood supply is unfavorable for the development of the bacteria.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Thirty-three living larvae of the Mexican fruit fly (*Anastrepha ludens* Loew) were intercepted at Houston, Tex., on November 19, 1935, in 27 grapefruit in ship's stores from Mexico. A living larva of the pink bollworm (*Pectinophora gossypiella* Saund.) was taken at San Pedro, Calif., on January 18 in a cottonseed in baggage from Hawaii. A specimen of *Eurytoma onobrychidis* Nikolskaya arrived at New York on January 16 in seed of *Onobrychis viciaefolia* in the mail from Germany. A. B. Gahan states that this eurytomid is said to be phytophagous. Three living adults of the weevil *Brachyrhinus porcatus* Hbst. were taken at Buffalo, N. Y., on January 27 in soil around freesia and violet plants in the mail from Germany. A living larva of the oecophorid *Endrosis lacteella* Schiff. arrived at Honolulu, Hawaii, on August 2, 1935, in a walnut in the mail from New Zealand. A living adult of the chrysomelid *Doryphora uniformis* Jac. was taken at Charleston, S. C., on October 21, 1935, with banana debris in cargo from Panama. H. S. Barber reports this as new to the National Museum collection. A living adult of the West Indian cane weevil (*Metamasius hemipterus* L.) was collected on July 7, 1935, on sugarcane in the field at Manati, P. R. A living larva of the chrysomelid *Psylliodes chrysocephala* L. was intercepted at Philadelphia on January 18 in a radish root in stores from Spain. Living specimens of the gladiolus thrips (*Taeniothrips simplex* Morison) arrived at San Francisco on October 24, 1935, on carnation leis in baggage and quarters from Hawaii. This is a new name for this thrips which was previously known as *Taeniothrips gladioli* M. & S. Living specimens of the scale insect *Parlatoria fluggiae brasiliensis* Costa Lima were taken at New Orleans on February 8, 1935, on oranges in stores from Brazil. A living specimen of the coreid *Hypselonotus concinnus* Dall. arrived at Brownsville, Tex., on January 21 on a gardenia in cargo from Mexico. An adult of *Bruchidius cisti* (Fab.) was taken at Washington, D. C., on December 18, 1935, with seed of *Onobrychis viciaefolia* in the mail from Italy. This bruchid was intercepted at New York in 1920 and 1923 with seed of *Cytisus laburnum* from France.

Pathological interceptions of interest.--*Anguillulina dipsaci* (Kuhn) Gerv. and V. Ben. was intercepted in potatoes from Spain for the first time on March 9 at Houston. A new variety of *Cephalobus butschlii* de Man was intercepted at Boston March 3 in taros from Barbados, B. W. I. A leaf spot of *Anisacanthus* sp. from Mexico intercepted in baggage at Roma, Tex., proved to be due to an unusual but immature ascomycete. Our first interception of *Colletotrichum phomoides* (Sacc.) Chester from South America was made on February 28 at New York in tomatoes from Brazil. *Diplodia cerei-triangularis* Speg. was intercepted for the first time on October 4, 1935, at San Francisco on *Pachycereus* sp. from Mexico. *Erysiphe cichoracearum* D. C. was intercepted on March 4 on *Hyssopus* sp. from India at the Washington Inspection House. *Exosporium palmivorum* Sacc. was intercepted for the first time on February 12 at New York on *Phoenix* sp. from Italy. *Gloeosporium maxillariae* Allesch. was intercepted at San Juan, P. R., on August 13, 1935, on *Lycaste* sp. from Nicaragua, though the only report in Stevenson's manual is from Berlin, Germany. *Helminthosporium allii* Campanile was intercepted on onion for the first time on March 17 at Philadelphia in stores from Italy. Heterodera marioni (Cornu) Goodey was intercepted on Osmanthus aquifolium from Japan on February 28 at San Francisco. Potatoes from Mexico intercepted on March 13 at Naco, Ariz., and on March 26 at Douglas showed unusually severe infestations of H. marioni. Our first interception of Heterosporium allii Ellis and Mart. from Holland was made on March 18 at Baltimore on leek. Mycosphaerella citrullina (Smith) Gross. was intercepted on March 16 at New Orleans on squashes from Cuba. Phyllosticta minutella Bub. and Dearn was intercepted for the first time on September 27, 1935, at San Francisco on maple leaves from Nova Scotia. Sclerotium oryzae Catt. was intercepted from Ecuador and Persia for the first time on February 11 and March 2, respectively, in rice straw at New York. Septoria citri Pass. was intercepted from Palestine for the first time on March 3 on oranges at Baltimore. S. gladioli Pass. was intercepted from Austria for the first time on March 7 at Chicago on gladiolus corms. Our first interception of Septoria pastinacina Sacc. was made on February 15 at New York on parsnips from Spain. Tolyposporella brunkii (Ell. & Gall.) Clint., a smut of the family Ustilaginaceae, was intercepted on August 8, 1935, at Hidalgo, Tex., on a grass the specialists cannot determine, from Mexico. A good collection of rye straw severely infected with Urocystis occulta (Wallr.) Rabh. was made at Baltimore on March 19 from bottle jackets from Denmark, our first interception of the disease from that country. Uromyces cestri Lev. was intercepted for the first time on February 28 at Miami on Cestrum sp. from Cuba.

DOMESTIC PLANT QUARANTINES

Autogiro used for locating citrus in Louisiana marshes.--The problem of surveying the citrus growth in the marsh areas of Louisiana was recently solved by the use of an autogiro. Moats on which citrus exists were located by the use of high-powered binoculars, and were mapped on air photo compilations supplied by the Coast and Geodetic Survey. This method of systematically flying over the areas made possible the discovery of heretofore unknown locations of citrus growth and proved an ideal way to survey the swamp areas. The abandoned and escaped citrus trees will be destroyed by W. P. A. labor on citrus canker eradication.

Citrus canker in Calcasieu Parish, La.--A single tree in a clump of several dozen Citrus trifoliata near Bell City, La., was found infected with canker on February 25. This area represents a new location in current work, no canker having been found in Calcasieu Parish for 6 years.

Large planting of Citrus trifoliata eradicated in Texas.--One of the properties having the largest number of trifoliates in the Houston, Tex., district was recently worked by relief laborers on citrus canker eradication. For 3 days all the W. P. A. laborers in the area were assigned to this property and with the use of a 1½-ton truck they pulled 390 large trees. The owner was at first opposed to the removal of the trees, having sacrificed a grapefruit grove on account of canker some time ago, but was finally brought to the realization of the public benefit to be gained and has since cooperated in the work. Inspections for citrus canker are being continued throughout the citrus-growing region of Texas and some recurrent infections are reported from properties where the canker has previously been found.

St. Louis ranks first in number of quarantine violations intercepted.--A summary of the shipments of nursery stock and plant products intercepted by transit inspectors in 20 cities in February shows that more apparent violations were caught at St. Louis than at any other station, 42 citrus fruit shipments from the Mexican fruit worm area having been noted without the Federal permits attached.

Willful violation intercepted.--A parcel-post package shipped from Washington, D. C., to a point in Washington State, containing 36 shrubs, a cupful of soil, a statement that "sender claims nothing fragile" and a note inside, "If you don't want Jap. beetle, wash all dirt off roots down sink", and making up a complicity of violations of plant quarantine and postal regulations, was intercepted at Spokane by transit inspector M. E. Connolly and promptly turned back to the sender. The report has been referred to the proper Bureau and postal authorities for investigation.

Escaped peach trees destroyed in blossoming period.--W. P. A. laborers destroying nonproductive peach trees for the control of the phony peach disease concentrated their efforts on escaped trees in the recent blossoming period, and in the latter half of March the crews removed over 3 million such trees from 7,120 properties in Alabama, Arkansas, Georgia, Illinois, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Texas. Excessive rains and high winds beating the blossoms from the trees very materially reduced the period for quickly locating the escapes by means of the flowers. In the 7½-month period ending March 28, during which W. P. A. work has been carried on in the above States, the number of peach trees destroyed, including abandoned orchards, escaped trees, and those infected with the phony peach disease, totals over 15 million. Arrangements were recently made for increasing the labor, nearly doubling the number of men now employed.

White pine blister rust control areas established in Maryland.--Areas for growing white pine in *Ribes*-free zones in parts of the counties of Allegany, Garrett, and Washington, Md., and in Fort Frederick State Park and the Loch Raven Reservation, owned by the City of Baltimore, were legally set aside under regulations established by the Maryland State Board of Agriculture, effective December 1, 1935.

Peach mosaic survey begins in six States.--Arrangements are being completed for a cooperative survey of peach-growing areas in Texas, Colorado, Kansas, Iowa, Nebraska, and New Mexico to determine the distribution of the peach mosaic disease, now known to exist in Colorado, Texas, California, and Utah. W. P. A. workers who were trained to identify the disease last year while eradicating nonproductive peach trees in Delta and Mesa Counties, Colo., will be employed again this season. The project will be resumed as soon as weather conditions permit.

CONTROL INVESTIGATIONS

Digestion in leaf-eating insects.--A study has been begun by P. A. Woke and F. H. Babers on the digestion in leaf-eating insects. They are working on the enzymes in the digestive tract of the southern armyworm, and are making a survey of the enzymes occurring and where they occur. This work will be followed by a study of the absorption of the products of this enzyme action by the insect or subsequent further splitting of the compounds.

Spraying equipment tested.--Tests of a high-power sprayer for the project for the control of gypsy and brown-tail moths were completed on March 10. The sprayer was operated for a period of 80 hours at pressures of 1,000 pounds, with frequent short intervals at 1,500 pounds per square inch. The sample sprayer passed the tests and 12 units have been ordered.

INSECTICIDE INVESTIGATIONS

Our idea of pyrethrins' structure may have to be altered.--The investigations, begun over a year ago by F. B. LaForge, H. L. Haller, F. Acree, and P. Schaffer were undertaken with the object of preparing the two pyrethrins in pure condition for comparative tests on insects. In the early stages of the work a new and more convenient method for the preliminary purification of the extractives of the flowers was developed and a process was discovered for the partial separation of the two pyrethrins from each other. Later it became necessary to repeat some work reported by Staudinger and Ruzicka, especially that on the semicarbazones of the pyrethrins and of pyrethrolone. The pure semicarbazone of pyrethrin II was prepared for the first time. Pyrethrolone semicarbazone was readily obtained from the semicarbazones of both pyrethrins. It agreed in its properties with the material described in the literature, but repeated analyses indicate that it possesses a formula with two hydrogen atoms less than in the heretofore accepted formula. Analyses of a number of derivatives also indicate that they contain two hydrogen atoms less than the reputed content. Pyrethrolone itself proved difficult to purify. While the hydrogen content seemed to agree with the formula $C_{11}H_{14}O_2$ instead of the accepted $C_{11}H_{16}O_2$, the carbon content was always 1.0-1.5 percent less than is required by the last-mentioned formula. These findings have an important bearing on the structure of the pyrethrins and are being further investigated. The isolation of the pure unaltered pyrethrin is a matter of considerable difficulty but one of the greatest importance from several standpoints.

Survey of commercial calcium arsenates begun.--The substitution of calcium arsenate for lead arsenate in spraying fruit would be of great importance because it would get rid of the menace of lead poisoning. However, calcium arsenate has always been erratic, in that it appears satisfactory at times, and at other times it proves very harmful to foliage. The Division has just started an investigation of the 19 brands now on the market, in order to bring to the attention of the entomologists of the Bureau the differences between them. So far, results are available only for soluble arsenic by a method proposed by the New York Agricultural Experiment Station. This method is represented as making possible a choice between safe and unsafe brands; in our hands it has given results running from 0.2 to 11.5 percent soluble As_2O_5. The improved materials being offered by four of the manufacturers are all less soluble than the corresponding regular brands.

Complete information on cube and related plants.--There has just become available, in the form of mimeographed publication E-367, an important compilation by R. C. Roark entitled, "Lonchocarpus Species (Barbasco, Cube, Haiari, Nekoe, and Timbo) Used as Insecticides." Although cube root had been shown by N. E. McIndoo and A. F. Sievers in 1924 to have value against certain species of insects, the fact that its botanical origin was in doubt and that nothing was known of its chemical composition retarded its development as an insecticide. In 1930 the identification of one of the most potent kinds of Peruvian cube as Lonchocarpus nicou (Aubl.) DC., by E. P. Killip and A. C. Smith, enabled the systematic collection and cultivation of the plant to be undertaken on a commercial scale. During the past 5 years growing interest has been shown in cube by entomologists, chemists, insecticide manufacturers, and exporters of South American products, and recently it has been brought into the United States in commercially significant quantities. It is the purpose of this compilation to bring together all the data relating to cube and to other plants of the genus Lonchocarpus known to have insecticidal action. It is hoped that this publication will be helpful to those interested in insect control and, more especially, that it will stimulate research to fill many gaps in our present knowledge.

BEE CULTURE

Clear medium devised for culturing Bacillus larvae White.--A clear medium has been devised by C. E. Burnside for culturing B. larvae. This bacterium, which causes American foulbrood of bees, does not grow readily on an ordinary culture medium but when unheated egg yolk is mixed with the agar fairly luxuriant growth is obtained. A distinct disadvantage of this egg-yolk medium is its turbidity. Numerous attempts have been made to devise a clear medium suitable for culturing this organism by adding other accessory food products. When egg yolk was omitted, however, B. larvae did not grow so luxuriantly as when it was added. In comparative tests at the National Agricultural Research Center, Bureau of Entomology and Plant Quarantine, Beltsville, Md., fully as luxuriant growth was obtained when a small amount of egg yolk was spread over the surface of the medium and 2 or 3 drops mixed with the inoculum as when the egg yolk was mixed with the agar. This method of adding egg yolk promises to give a practically clear medium for culturing B. larvae without diminishing the luxuriance of growth.

More desirable type of microsyringe developed.--A microsyringe for the artificial insemination of queen bees, the syringe being of the Watson type but more readily constructed because the screw passed through a wooden instead of a metal cap, was developed at the Somerset laboratory a few years ago. This syringe, like the original Watson model, contained a spring to force back the plunger. At times, when the spring was pushed down, the cement holding the cap to the glass tubing became loosened and was pushed off under the tension. A new type of syringe has been devised by W. J. Nolan, of the Beltsville laboratory, which eliminates the spring. The new syringe consists of an automatic pencil in which a plunger is substituted for the lead. The addition of a glass point for the plunger to work in completes the apparatus. Since the point is the only part made of glass, the new syringe is not nearly so fragile as the older types and is more readily repaired.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

New mosquito records for Cuba.--In a lot of 35 adult and larval specimens of mosquitoes sent in by Dr. Henry P. Carr, of the Comision de Malaria de Cuba, were two larvae and one female *Anopheles atropos* D. & K., a male and a female *Culex bahamensis* D. & K., and a new species of *Culex* of the subgenus *Mochlostyrax*, all identified by Alan Stone. The *Anopheles* has never been recorded from outside continental North America; and, although *C. bahamensis* probably occurs throughout the Greater Antilles, this is the first known record from Cuba. These were all collected in the vicinity of Havana.

Specimens of African fruit flies and parasites received for the National Collection.--Among a quantity of insect material recently brought from Sierra Leone, West Africa, by J. M. Gough, were large series of specimens of *Ceratitis giffardi* Bezzi and *Ceratitis punctata* Wied. The former was not previously represented in the National Museum collections, and of the latter these collections contained only two specimens. Included with the fruit flies were also nice series of the braconid parasites, *Hedylus giffardii* Silv., (*Biosteres*) *Opius caudatus* (Silv.), and *Opius* ? *perproximus* Silv., of which only the second was represented in the National Collection.

A European parasite of wheat-stem sawflies in the United States.--Two specimens of a parasite reared from *Trachelus tabidus* (Fab.) taken at Adamsville, Pa., and recently submitted for determination, have been identified by C. F. W. Muesebeck as *Microbracon terebella* (Wesm.). The material was reared by E. J. Udine, of the Carlisle, Pa., laboratory of the Division of Cereal and Forage Insects. These are the first specimens of this parasite to be recorded from the United States.

Specimens of Fornicia clathrata received.--Among material collected by E. J. Hambleton in Brazil in 1930, and recently submitted for incorporation in the National Museum collections, were four specimens of *F. clathrata* Brulle, determined by C. F. W. Muesebeck. *Fornicia*, of which *clathrata* is the type, is an anomalous genus of Braconidae, subfamily Microgasterinae, known from tropical America, Africa, Ceylon, and the Philippine Islands. So far as recorded, all species parasitize slug caterpillars, of the family Limacodidae. The genotype, which was not previously represented in the National Collection, has been reported only once before since its description in 1846. It is said to attack larvae of *Sibine fusca* Stoll.

A new fossil mite.--A fossil mite in Cretaceous amber from Canada has been received for identification from the Museum of Comparative Zoology at Harvard University. It represents a new species of *Bdella* and is the second oldest fossil mite known. The oldest known fossil mite is from the Devonian of England. Both of these fossil species belong to the same suborder, the Prostigmata.

Another record of the bedbug from chicken houses.--D. C. Parman has transmitted, through the Division of Insects Affecting Man and Animals, specimens of the common bedbug (*Cimex lectularius* L.) from Uvalde, Tex., determined by H. G. Barber. Mr. Parman reports a heavy infestation of this bug in chicken houses at Uvalde last winter.

Chionaspis pinifoliae in Europe.--Specimens of a scale insect on white pine needles from Germany, intercepted at New York, have been identified by Harold Morrison as *Chionaspis pinifoliae* Fitch. This appears to be the first record of the occurrence of this insect in Europe.

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FRUIT INSECT INVESTIGATIONS

Methods for breeding Aenoplex carpocapsae Cush.--Earl Lott, of the Moorestown, N. J., laboratory, reports progress in the development of methods for rearing A. carpocapsae, an indigenous parasite of the codling moth. This species is apparently absent as a parasite of the codling moth in some sections. It has been determined that the adults attack prepupae in the cocoons, piercing the silken wall of the cocoon to paralyze the host, and to lay from one to several unattached eggs beside its body. The larvae are not notably cannibalistic, but usually only one matures on each host. All feeding is external, the larvae moving freely about within the cocoon during their whole developmental period and cocooning beside the remains of the host when mature. After mating, the ovipositing females are confined in small cages having a gauze floor. These cages are placed over codling moth cocoons from which excess paper has been torn on the face exposed to the gauze. Each day the exposed cocoons are removed, opened, and all parasite eggs are shaken into petri plates. Additional host prepupae are removed from their cocoons and artificially paralyzed by immersion in hot water at exactly 54° C. for 5 minutes. These are then distributed in small salve boxes 1-1/2 inches in diameter, about 30 host prepupae being required to cover the bottom of the container. The eggs are then distributed over the paralyzed larvae at the rate of one to each host. Hatching and development proceeds in this container in a satisfactory manner, an average of about one parasite maturing from each two eggs used.

Petroleum oils more effective than vegetable oils in scale control.--A. W. Cressman, Wooster, Ohio, has found that highly refined petroleum oil is much more effective against the eggs of certain scale insects than are various vegetable oils. The test insect used in this particular series of experiments was a species of Chionaspis on willow. The same series of experiments gave information on the relation between the proportion of fatty acid present, the drying properties of the oils (as measured by the iodine number), and their effectiveness. The results of these experiments were as follows:

Oil used (4 percent strength throughout)	Acid value (cc. N. NaOH per 100 grams of oil)	Iodine number (Percent by weight of iodine absorbed)	Scale with all eggs and crawlers dead
			Percent
None	--	--	2.0
Petroleum (highly refined)	0.28	1.6	73.1
Peanut	3.52	85.0	51.3
Refined cottonseed and fatty acid	3.52	111.3	25.2
Refined cottonseed	0.22	111.5	9.6
Crude corn	7.63	125.9	19.7
Refined corn	0.10	123.8	3.7

Certain tentative conclusions can be drawn from these data. Petroleum oil was definitely more effective than any of the vegetable oils. Differences are much greater when dealing with the eggs of this armored scale than in treatments of mealybugs, where the oil comes into immediate contact with the insect's body. There was a marked correlation between the drying properties of the oils and their effectiveness. These differences continued as the crawlers began to emerge from beneath the scale covering. Nearly all of those emerging were killed by the residues of peanut oil or petroleum oil on the twigs, whereas appreciable numbers were able to settle on the twigs sprayed with corn or cottonseed oil. Apparently the latter two oils had hardened sufficiently to permit the young larvae of the scale insects to crawl on the surface without taking up any of the oil. The presence of fatty acids also appeared to increase the effectiveness of the vegetable oils.

Notes on life history of Microbracon hebetor Say.--H. C. Donohoe, of the dried-fruit insect laboratory at Fresno, Calif., reports on the results of experiments with this parasite wherein the females were provided with a surplus of full-grown larvae of the raisin moth (Ephestia figulilella Greg.). At a constant temperature of about 90° F. (10 records), more than 300 larvae were paralyzed by 1 female during her life. At about 80° (5 records) 625 were paralyzed. Stinging of larvae continued after the insects had lost their ability to reproduce, but the number paralyzed per day (about 25 in early life) declined as the age of the parasites increased. In the case of 5 females held at 80°, of which the offspring totaled 1,100, the proportion of male progeny increased with the age of the parents; all progeny (201) from eggs laid after the 15th day of the life of the parents were males. At 80°, 4 females produced an average of 248 offspring, the maximum being 401. About 14 percent of 837 paralyzed larvae, held at 90°, recovered partially or completely. Pupation and emergence of recovered larvae was recorded. Recovery among paralyzed larvae (589) at 80° amounted to 17.5 percent. There was evidence that the proportion of larvae that recovered increased with the age of the parasites at the time stinging occurred. At 90° the egg-to-adult period most frequently observed was 9 days. At 80° the period averaged 12 days. Adults reared in a temperature of 90° were pale brownish yellow while those at 80° were from dark brown to black. Others from the same stock, reared in a room where temperatures ranged from about 50° to 80°, were glossy black.

Winter killing of Japanese beetle larvae.--I. M. Hawley and T. N. Dobbins, Moorestown, N. J., report that additional surveys made during the early part of April bore out the previous statement that mortalities of larvae during the winter just passed have been high, frequently running above 50 percent, in areas in New Jersey south of the latitude of Trenton, in the southeastern portion of Pennsylvania below Philadelphia, in northern Delaware, and in northeastern Maryland; in areas where there was a heavy snow cover on the ground the mortalities were usually less than 5 percent, these conditions obtaining in the northern half of New Jersey and in Pennsylvania north and west of Philadelphia. A study of the situation indicates that these high mortalities were not due solely to the lowering of the soil temperature. A study of weather conditions during the cold periods in 1934 in comparison with those of 1936 showed that both air and soil temperatures were lower in 1934 than in 1936, and that the cold period was equally long in both seasons. The main difference in the two seasons was in the form and amount of precipitation prior to and during the cold spells. In 1934 there was only 0.66 inch of rain in the 24 days prior to the advent of low temperatures, while in 1936 there was 5 inches of rain in the 16 days prior to the first cold day. Moreover, in 1936 the cold period was ushered in by a rainstorm that turned to sleet and produced an ice coat on the ground in many areas where high mortalities have occurred, whereas in 1934 there was no precipitation during the first 3 days of cold weather, after which there was snow. In 1936, therefore, the soil was thoroughly water saturated, and as the temperature fell the soil was frozen solid. It appears that, as the ice in the ground was cooled below the freezing point during this season, the pressure produced was largely responsible for killing many of the larvae. It also seems probable that in the saturated soil there was much free water in the bodies of the hibernating larvae, and as this expanded the body tissues were ruptured. Larvae in such a moist environment are apparently less cold hardy. The study also suggests that in determining the conditions that bring about a substantial mortality of the larval population, the degree of saturation of the soil is a factor of equal importance to the factor of actual temperature.

Resistance to drying of spores of types A and B of the milky disease of Japanese beetle larvae.--S. R. Dutky, Moorestown, tested during April 1936 blood films containing spores of types A and B of the milky disease dried on glass slides since July 1935 to determine their ability to produce the disease upon injection into healthy larvae. He found that the time of development of the disease was approximately the same as for fresh blood suspensions of the spores. Spore counts on the blood of injected larvae at intervals of 1, 2, 3, 4, and 5 days indicated that over 75 percent of the injected spores had germinated by the fourth day.

Derris as a repellent for Japanese beetles.--W. E. Fleming and R. D. Chisholm, Moorestown, prepared a series of derris compounds containing rosin and white pigments to determine the effect of these materials on the adhesion of derris deposits and the effect of sunlight on these deposits. Of the several pigments tested, the best protection was shown with zinc oxide, titanium pigment (barium base), and titanium pigment (calcium base), each of these materials showing over 50 percent of the initial deposit still active after the exposure period, the greatest initial deposit being obtained with zinc oxide. Derris compounds containing 10 percent of rosin and 2 percent of phenol and other organic compounds were tested to determine their resistance to decomposition on exposure to light. The best protection resulted from the use of phenol, aniline, and quinine, there being in each case 50 percent undecomposed on exposure to light.

MEXICAN FRUIT FLY CONTROL

Mexican fruit fly in lower Rio Grande Valley.--Within the past month, 23 Anastrepha ludens Loew were trapped by inspectors in Texas. Fifteen of these specimens were taken in the valley before April 15. During the same period 7 other specimens were trapped in the brush north of the valley. Only 1 adult was trapped after the middle of April. This specimen was taken at Premont in Jim Wells County. The host-free period for the lower Rio Grande Valley went into effect April 1. Before the end of the month all the groves had been checked for ripe fruit remaining on the trees. Practically all fruit found was cut and examined for larval infestation before burial. No larvae were found. Two thousand new glass traps were received recently. Four hundred were sent to Mexico and the remainder were put in operation in Texas.

DATE SCALE CONTROL

No scale found.--Scouting was completed in the Coachella Valley, Calif., during the month. Fan-palm inspection was continued, 454 palms being inspected in April. Most of the infested area has been covered and no scale found. The final inspection of the Reed Garden in the Imperial Valley was made and no scale found. No scale has been found in this garden since February 1934 and none in the Imperial Valley outside this garden since April 1933.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Winter mortality of European corn borer.--A. M. Vance, of the Toledo, Ohio, laboratory, reports that no evidence of a pronounced lethal effect on corn borer larvae from the low temperatures of the past winter has appeared in any localities where observations have been made. On the contrary, a lower mortality rate is indicated than that found in March 1934. D. W. Jones found no winter mortality on the Eastern Shore of Virginia up to March 9. Since that date mortalities as high as 4 percent have been noted in some of the more heavily infested fields.

Late fall seeding of annual legumes avoids early spring aphid infestation.--L. P. Rockwood and Max M. Reeher, of the Forest Grove, Oreg., laboratory, report that on plots of vetches and peas seeded on September 16 and on October 1, 22, and 30, 1935, and on March 20, 1936, Illinoia pisi Kalt. were present in the same numbers on April 2 as they had been on March 2, on the September 16 and October 1 plots. There were more on the common vetch plots than on the plots of Austrian winter field peas, which indicates a better winter survival on common vetch. By April 16, during the period of abnormally warm weather without precipitation, they had begun to increase rapidly, especially so on the Austrian pea plots, but no alates had yet invaded plots seeded on October 22 and later. Alates were being produced on the September 16 plots at that time but none were produced on the October 1 plots until after April 28. The October 22, October 30, and March 20 plots were invaded for the first time by immigrant alates on April 29 and 30. Therefore fall-sown vetches and peas seeded on October 22 (and probably on October 15) or later would have remained free of aphid infestation up to about April 29, or later, if at a distance from earlier sown annual legumes. Moreover, the September-sown plots were the sources of the earliest spring migrant alates.

Pea aphid in Kansas.--E. T. Jones, Manhattan, Kans., reports that no I. pisi have been found in alfalfa fields in counties in the vicinity of Manhattan, either last fall or this spring. Owing to conditions adverse to their development, it has been difficult for the aphids to build up, even in the most favorable situations in greenhouses and hotbeds, populations sufficient to effectively test alfalfa selections for aphid resistance. Of 200 aphid-resistant selections from about 40 varieties of alfalfa, in a hotbed test, only 10 were found to be aphid-free at the end of 3 months' exposure to infestation. Reinfestation has shown only 4 of these strains to be aphid-free at the end of 3 weeks' exposure. The 4 aphid-free selections were from Grimm, Kansas 308, and 2 strains of Turkestan.

Parasites of Trachelus tabidus Fab.--C. C. Hill, of the Carlisle, Pa., laboratory, reports that three male specimens of Microbracon terebella (Wesm.) were reared from the black grain-stem sawfly (T. tabidus) by E. J. Udine, who collected the material at Adamsville, Crawford County, Pa. According to C. F. W. Muesebeck, who determined two of the specimens, this is the first record of the occurrence of this parasite in the United States. In England it is an important parasite of wheat sawflies. This spring 94 Trichacis remulus Walk. were released by J. S. Pinckney at Salisbury, N. C., and 48 at Gretna, Va., in connection with biological control work on the hessian fly. These parasites were shipped from France by H. L. Parker.

Fly-resistant spring wheats.--E. T. Jones, of the Manhattan laboratory, reports that in tests at Parsons, Kans., a number of spring wheats have shown outstanding resistance to the development of a heavy natural infestation of hessian fly larvae of the second spring brood. Examination of representative samples from about 400 test rows has recently been completed. The data obtained show that 23 percent of 371 strains in the test had a tiller infestation of less than 17.5 percent (average for the Marquillo selection resistant checks). This group of resistant selections consisted of 61 strains of

Triticum vulgare, 7 additional Marquillo selections, and 17 strains of other species of *Triticum*. The average infestation for the susceptible checks (*Ceres*) was 56.9 percent. Included among selections with from none to very light infestations are Livingstonia, Illinois No. 1 W 19, Durum C.I. No. 3210, a white selection of Bobs, Quality, Durum C.I. 4131, Marvel, Polish, Illinois No. 1 B 38, Supreme, Mangan, and several other strains of common and Durum wheats.

JAPANESE BEETLE CONTROL

Lead arsenate applied by convict labor at Greenville, S. C.--In cooperation with officials of the South Carolina State Crop Pest Commission, three employees of the project, working from April 22 to May 5, applied 8 tons of arsenate of lead to 16 acres in and surrounding the sections of Greenville, where 89 beetles were caught in 799 traps during the past season. Sixty-nine beetles were caught in a single yard, and all but 3 of the remainder in the same or the four adjacent blocks. Two beetles were trapped in a section two blocks away, and 1 beetle about a mile away. Each infested section is in close proximity to a railroad. An appropriation of $1,600 from the State contingent fund was made available for the purchase of material. Two high-pressure sprayer trucks were driven to Greenville from the project's warehouse at New Cumberland, Pa. The Greenville soil treatment was unique in several respects. The 16 laborers assigned by the State to assist the Federal employees were convicts under guard. In addition, this was the first time that an injunction had been obtained to prevent the application of lead arsenate to private property. A local physician obtained an injunction in the court of common pleas to prevent the crew from going upon his property to treat the soil. The plaintiff alleged that the substance used was poisonous and would "constitute a menace to their health and the safe and free enjoyment of said premises." Dr. F. E. Kitchen, chairman of the agricultural committee of the Greenville Chamber of Commerce, and Franklin Sherman of Clemson College, induced the physician to withdraw the injunction. One of the Greenville newspapers referred to the proceedings as the "first anti-anti-Japanese beetle injunction."

No Michigan State Japanese beetle quarantine this spring.--Following a public hearing held in Detroit, Mich., on April 23 to discuss the advisability of placing an intrastate Japanese beetle quarantine on the infested sections of Detroit, James F. Thomson, Commissioner of the Michigan State Department of Agriculture, announced that he is of the opinion that no quarantine should be placed upon the Detroit district for the present season. The Bureau was represented at the hearing by C. W. Stockwell and T. C. Cronin. The Michigan authorities desire to proceed with the treatment arrangements already made by the Parks and Boulevards Department of the City of Detroit, and to intensively trap throughout the city during the coming year to determine whether or not the soil poison to be applied to a limited portion of the city will suppress the infestation found there last year.

Lead arsenate treatments in Detroit follow completion of Erie, Pa., work.--Light snowfalls and rain on April 18 and 21 interrupted soil treatments applied in Erie, Pa., from April 13 to 24. Two Federally owned tank sprayers were provided to apply the State-purchased arsenate of lead. Hosemen and other laborers were also provided by the Pennsylvania Department of Agriculture. Four tons of lead arsenate were sprayed on 8 acres of ground in sections of Erie outside previously poisoned areas where Japanese beetles were trapped last year. At the conclusion of the Erie treatments, the sprayer trucks were driven to Detroit, Mich., where similar operations were begun on April 30.

Glassless, screened greenhouse replaces beetle-proof enclosure.--Rather than replace a large beetle-proof, screened hydrangea cage which collapsed under the weight of snow and sleet during the severe winter, a classified nurseryman in the Philadelphia suburban area has removed all glass from a 30 by 150 foot certified greenhouse and has screened this in the same manner as the outdoor cage. The glass will be replaced in the fall.

Soil conservation plants certified.--Inspectors from the New Cumberland, Pa., station have inspected and certified nearly a million plants and trees for the local Soil Conservation Service. Wild honeysuckle and coral berry are being gathered in quantities in that area and forwarded to several C. C. C. camps in Pennsylvania and in the Southern States for planting as soil-anchoring plants.

Hundreds of gypsy moth egg clusters found on scrap iron.--Inspection of two carloads of old car rails and a carload of scrap iron known to contain gypsy moth infestation resulted in the location and destruction of 269 egg clusters in the two carloads of rails inspected at Milford, N. H., for shipment to Butler, Pa. A single rail in this lot yielded 37 egg masses. Inspection at Laconia, N. H., of a carload of scrap iron consigned to Johnstown, Pa., disclosed 15 egg clusters that would have traveled to western Pennsylvania had not the inspector found and destroyed them.

Dutch elm disease activities.--Elm foliage began to appear by the end of April. Foliage buds had burst on some trees in the vicinity of White Plains, N. Y., as early as April 20 and leaves had slightly unfurled by the end of the month. Drastic reductions were made in the W. P. A. force at the end of the month to change from a winter-sanitation to a summer-scouting basis. Most of the men retained will be trained in scout schools to be held the middle of May. In the meantime they will devote most of their time to burning accumulations of elm material taken out during the sanitation campaign, and to scouting the coast line of Long Island and the banks of New Jersey rivers to search for elm driftwood that might have been washed down from infected and noninfected sections during the recent high-water stages.

Sanitation work at outlying infections.--Sanitation work in Putnam County, N. Y., will be centered about three outlying Graphium infections. The centers of work will be an area surrounding the infection north of Peekskill, another surrounding the Lake Mahopac infection, and a third about the Brewster infection. Some of this work will extend beyond the known infection zone. At the same time it is planned to complete the area between these disease centers, thus clearing up the entire infected zone.

Fire hazard increases.--Burning of elm material is becoming more hazardous as the spring season advances. Extra precautions are being taken by eradication crews to avoid fire damage. In some areas the no-smoking rule has again been applied.

Field headquarters transferred from White Plains, N. Y., to Bloomfield, N. J.--Effective April 6, the field headquarters supervising Dutch elm disease, corn borer certification, and Japanese beetle and gypsy moth quarantine enforcement was transferred from the ninth floor of the Westchester County Office Building, White Plains, N. Y., to a three-story brick building at Glenwood Avenue and Henry Street, Bloomfield, N. J. When full occupancy of the new field headquarters is obtained the garage housing Dutch elm disease equipment will be moved over from West Orange, N. J. Space has been provided for the New Jersey leader of Dutch elm disease activities, and for the State cooperating personnel.

FOREST INSECT INVESTIGATIONS

Damage to shelterbelt trees by army cutworms in Kansas reduced.--Late in March and early in April 1935, heavy losses of newly planted trees occurred near Pratt, Kans., as a result of root girdling by the army cutworm (*Chorizagrotis auxiliaris* Grote). A survey of these areas of infestation made during the last week of March 1936 by H. H. Walkden, of the Division of Cereal and Forage Insect Investigations and J. A. Beal and N. D. Wygant, of this Division, indicated that the damage to the trees this spring would be much lighter. Very few cutworms were present in their natural habitat, under cow chips in pastures. Only a few could be found on the strips where trees were planted and in no case were they damaging the trees. Where they occurred on the strips they were found feeding on volunteer wheat and other weeds and they appeared to prefer these to the trees. With delayed cultivation, leaving this wheat and other green vegetation on the strips until cutworm feeding was over (about April 15 in Kansas), no serious damage to the trees this year was anticipated. The fact that no cutworm damage has been subsequently reported from these areas during April substantiates the findings of the survey.

Balsam bark beetle in Rocky Mountain region.--J. A. Beal, of the Fort Collins, Colo., laboratory, reports that the work of the balsam bark beetle (*Dryocoetes confusus* Sw.) in alpine fir has been especially heavy during the past year. Numerous requests for information on insects killing alpine fir in the Rocky Mountain region have been received and examination of the trees or of the insects responsible for their death has invariably shown the balsam barkbeetle to be involved. In southern Colorado, in alpine fir stands of the Uncompahgre and Montezuma National Forests, large groups of red-tops from a distance resemble a mountain pine beetle outbreak in a lodgepole pine stand. Other southern Colorado forests on which similar losses have been heavy in alpine fir are the San Juan, San Isabel, and the Rio Grande. Similar losses have been reported from some of the National forests in Utah. The low value of the fir has thus far prevented any attempt at control of this insect.

Bark beetles breed in diseased trees.--C. W. Collins reports that records obtained by the Morristown, N. J., laboratory show that the smaller European elm bark beetle (*Scolytus multistriatus* Marsh.) and the native elm bark beetle (*Hylurgopinus rufipes* (Eichh.)) breed in elm trees attacked by the so-called "Cephalosporium die-back." The fungus was cultured from trees by the Division of Forest Pathology, Bureau of Plant Industry. Cephalosporium die-back of elm is common and the symptoms closely resemble those of the Dutch elm disease, caused by *Ceratostomella ulmi* (Schwarz) Buisman. Where both fungi are present in the same tree it is sometimes difficult to culture them both from samples taken from the tree. For this reason it is possible that *C. ulmi* might have also been present in some of the trees in which the bark beetles were found to have bred. The observations made do, however, indicate the possibility of beetles issuing from trees affected by the Dutch elm disease carrying *C. ulmi* to trees weakened by Cephalosporium die-back.

Notes on European spruce sawfly.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports on the European spruce sawfly as follows: "At Tupper Lake, N. Y., an examination in April of several foot-square samples of litter showed a population of slightly less than 1 live cocoon per square foot. At Orange, Conn., 28 unopened cocoons were collected from the litter under 10 trees on April 28. Of these, 23 were alive and 6 contained pupae, one of which was nearly in the adult stage. One of the remaining 5 had been parasitized by a small chalcid. The average cocoon population at Orange is also less than 1 per square foot, although in 2 of the samples there were 3 and 4, respectively. Cocoons collected the same day by G. A. Plumb, of the Connecticut Agricultural Experiment Station, were placed in the constant-temperature room that afternoon. An adult emerged on April 30."

Fluctuation in numbers of larch case bearer.--J. V. Schaffner, Jr., of the New Haven, Conn., laboratory, presents the following table giving information on the fluctuation of population of the larch case bearer (*Coleophora laricella* Hbn.) during the last 4 years at nine permanent sample plots in New England:

Locality	Number of larvae per lineal foot of twig				Dissections in 1936		Empty cases
	1933	1934	1935	1936	Living	Dead	
Connecticut:							
Woodstock	14	19	14	7	47	37	16
Maine:							
Corinth	47	29	86	5	22	28	50
Sydney	83	20	83	22	11	69	20
Massachusetts:							
Lunenburg	11	8	15	3	70	21	9
North Andover	29	24	17	7	37	60	3
New Hampshire:							
Berlin	35	17	28	11	52	33	15
New York:							
Greenfield	14	10	25	13	50	44	6
Saranac	6	40	45	31	70	29	1
Vermont:							
Sharon	15	48	34	29	57	40	3

Based on these counts, the infestations have decreased in every plot and the fall and winter mortality was unusually high.

Parasites of Neodiprion tsugae Middleton.--P. B. Dowden and P. A. Berry, of the New Haven, Conn., laboratory, report: "Spring emergence of parasites from *N. tsugae* cocoons collected at Sweet Home, Oreg., last fall has been rather encouraging. A colony of 348 females and 65 males of *Itoplectis montanae* Cush. was obtained from this material, and liberated in an infestation of *Diprion polytomum* Htg. at Tupper Lake, N. Y., on April 23. Another ichneumonid (undetermined) has been obtained in fairly good numbers. So far about 200 males and 8 females have issued. *D. polytomum* cocoons will be subjected to this species also."

Experimental spraying from an autogiro.--S. F. Potts, New Haven, reports that a 5-acre red pine plantation located near Providence, R. I., was sprayed from an autogiro with a concentrated lead arsenate-linseed oil-water mixture (one part arsenical to two parts of liquid by weight). This spray is about 100 times as concentrated as mixtures used in ground spraying and approximately 8 gallons were used per acre. The spray was released from the autogiro at the rate of 40 gallons per minute in a swath 50 feet wide. Observations on this test indicate that the autogiro may be effectively used in forest insect control work, but this must be confirmed by large-scale field experiments before definite conclusions can be drawn. To our knowledge, this is the first test of an autogiro in applying sprays to a forest, although no insects were present for this particular test. It is believed also to be the first time a liquid spray has been released from the air over a woodland.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Labor and accomplishments.--Up to March 28, 1936, under the W. P. A. projects, the following numbers of workers were employed under the gypsy moth projects, in the different States: Maine, 803; New Hampshire, 183; Vermont, 937; Massachusetts, 803; Rhode Island, 109; Connecticut, 790; New York, 243; New Jersey, 135; Pennsylvania, 1,146; total, 5,149. On the same date, under the W. P. A. emergency project, the numbers employed on brown-tail moth work were as follows: Maine, 597; New Hampshire, 578; Vermont, 21; Massachusetts, 584; Rhode Island, 22; and Connecticut, 32; total, 1,834. During the latter part of March about 1,300 men from C. C. C. camps were employed on gypsy moth work in sections east of the barrier zone, in New England. The abandonment of a number of C. C. C. camps in New England on April 1 affects the gypsy moth work, east of the barrier zone, to a considerable extent. In Massachusetts the working force will be reduced to 550 men. In Connecticut there will be 370 men available for gypsy moth work. In Vermont there will be a total of 210 men available. In New Hampshire all C. C. C. gypsy moth work will probably be discontinued, as the camps retained are a long way from the area where work had been planned. Under the P. W. A. brown-tail moth project the number of brown-tail moth webs cut up to the last week in March in the three States, namely, Maine, New Hampshire, and Massachusetts, was slightly less than 4,000,000. Of these over 2,250,000 were cut in New Hampshire and about 1,000,000 in Maine. It is interesting to note that many of the brown-tail moth webs cut in Maine were found on some of the islands in Portland Harbor, especially on Peakes Island. In the summer of 1935 a number of families were so annoyed by this insect that they left the island. The infestation, this year, was much greater than last year and, up to the end of March, over 171,000 webs have been cut, with a number more to be cut before the island is completed.

PLANT DISEASE CONTROL

Blister rust control activities in sugar pine region.--During the field season of 1936, approximately 2,250 men will be taken from the relief rolls for blister rust control work in the sugar pine region (California and Oregon). Twenty-three camps will be established in California and seven in Oregon. The supervisors and their assistants have recently made preliminary examinations of camp sites and Ribes-eradication areas, reporting that, although the more remote sites were still under snow, camp-construction work could be undertaken at any time on those lowest in elevation. At middle and low elevations, Ribes are in full leaf and flower, so that eradication conditions are favorable.

Blister rust control work started in Connecticut April 16.--J. E. Riley, State leader of blister rust control work in Connecticut, reported that the buds on cultivated gooseberry plants at New Haven were unfolding on March 28. Currant leaves were evident April 3. The first aecia were found on pine at Greenwich, Conn., on March 28. Our records at the Cambridge office indicate that the earliest date that aecia were ever reported in the region was March 27. During April the weather was abnormally cool and rainy, consequently the development of the vegetation was decidedly retarded; however, it was possible to begin Ribes-eradication work in Connecticut on April 16, in connection with the protection of nurseries that had applied for Federal permit to ship white pines interstate.

Barberry eradication in Indiana.--Wayne E. Leer, in charge of barberry-eradication work in Indiana, submits the following summarized report relating to accomplishments with P. W. A. and W. P. A. funds since August 1933. An intensive survey of 66 areas of escaped bushes in 28 counties has been made with labor employed with emergency funds. These areas comprise approximately 4,000 square miles of territory. The work has resulted in the eradication of approximately 14,000 barberry bushes. Mr. Leer reports that it has been necessary to extend the boundaries of infestation in several counties, and labor crews have been used to scout less intensively much wooded territory immediately adjacent to known areas of infestation, locating many scattered bushes. During the winter of 1935-36 emergency relief funds were used to make a survey of many of the larger cities in northern Indiana, including East Chicago, Whiting, Gary, Hammond, Michigan City, South Bend, and Fort Wayne. More than 5,000 bushes were destroyed on 200 different properties in those cities.

Barberry survey in Ohio.--City surveys were conducted during the months of January, February, and March, crews being located in Cleveland, Akron, Toledo, and their immediate suburbs. These cities cover an area of approximately 200 square miles, with a total population of 1,650,000 people. Harry

Atwood, in charge of barberry-eradication work in Ohio, reports that 31,000 man-hours of relief labor were required to make this survey. In Cleveland 4,250 bushes were removed from 297 properties; in Akron 5,538 bushes were destroyed on 89 properties; and in Toledo, 221 bushes on 66 properties.

COTTON INSECT INVESTIGATIONS

Cotton flea hopper migrations.--A series of flight-screen tests was continued in 1935 by K. P. Ewing and R. L. McGarr at Port Lavaca, Tex., to study the seasonal variation and the relation of wind direction to the migration of the cotton flea hopper. Most of the early infestation on cotton is caused by the migrations from weed host plants. The flight screens used were wooden frames covered with screen wire coated with tanglefoot. The 12 "standard" screens consisted of two 3 by 5 foot panels, with the bottom edge 3 feet from the ground, and placed so that they faced north, south, east, and west. Two towers with screens at elevations up to 24 feet were used to determine the movement at different elevations. Two revolving screens, so arranged that one side always faced the wind, were also used in comparison with the standard screens. The standard screens were erected in cotton fields and in ranch country. Those in cotton fields caught an average of 649 flea hoppers each during the season, as compared to 114 on screens in the ranch country. The percentages of flea hoppers caught on each side of the standard screens during the past 3 years were as follows:

Location	Year		
	1933	1934	1935
North side---	16.7	17.4	13.1
South side---	17.8	21.7	17.5
East side----	30.6	26.1	31.8
West side----	34.8	34.8	37.7

The season's catches at the different elevations on the tower screen were: 3 to 6 feet, 467; 9 to 12 feet, 303; 15 to 18 feet, 225; 21 to 24 feet, 423. Although during the season the total number of flea hoppers collected from the bottom screens on the towers was more than from any other height, during 5 of the 8 months more were collected from the top screens than from the others. More flea hoppers were collected from the east side of the tower screens than from any other direction. The revolving screens, located in the same fields as stationary standard screens, caught 866 flea hoppers during the season, in comparison with 680 on the comparable standard screens. On the revolving screens 449 of the flea hoppers were caught on the leeward and 387 on the windward side. From April 20 to June 30 records were kept of the direction of the wind movement. During these 71 days the prevailing direction of the wind was east, southeast, south, and southwest on 62 days, or 87.3 percent of the time, but only 49.5 percent of the flea hoppers were caught on the panels facing the east and south. During the same period of time the prevailing wind direction was west, northwest, north, and northwest 9 days, or 12.7 percent of the time, while 50.5 percent of the flea hoppers were caught on the panels facing west and north. These records show that the greatest catch was on the panels opposite to or at an angle to the prevailing wind. This was also true on the revolving screens, where the greatest number were caught on the leeward side. All of the flea hoppers caught on the screens were adults. The abundance in the air as shown by the screen catch, and the migration to the cotton fields was checked by examination of the cotton plants. During the last week of April there was a fairly large increase in the screen catch but field examinations showed the flea hoppers were not stopping on the cotton. The distinct, heavy migration from weeds to cotton occurred during the first week of June in 1935, which was nearly a month later than in 1934. During the last week of May an average of 10.1 flea hoppers were caught by the screens, and during the following week the catch increased to 60.4 per screen. Field inspections showed an increase during this period from 17.6 to 45.5 flea hoppers per 100 cotton plants. Examination of horse mint, a very abundant early host plant, showed that the population was rapidly decreasing on these plants during the time of the heavy migration and increase on cotton.

Emergence of cotton flea hopper.--Emergence of cotton flea nymphs from overwintering eggs in weeds collected last fall and caged this spring began on March 6, according to Messrs. Ewing and McGarr. The weather was very dry and very little emergence occurred in March and the first half of April. On April 17 there was 1.26 inches of rain and emergence increased, reaching a peak on April 28, with a total of 7,095 nymphs. The peak last year was on April 6. The emergence from a comparable number of cages during April in 1934 was 22,877 nymphs; in 1935, 38,595 nymphs; in 1936, 29,133 nymphs.

Oviposition of bollworm moths.--R. W. Moreland, College Station, Tex., reports that during April five species of plants were examined for eggs of Heliothis obsoleta Fab., with results as follows: Alfalfa, 4,800 plants and 58 eggs; bluebonnets (Lupinus subcarnosus), 1,280 plants and 30 eggs; and bluebonnets (L. texensis), 1,200 plants; corn, 500 plants; and false indigo, 200 plants without any bollworm eggs being found. Mr. Moreland also states that Dr. R. K. Fletcher, of the Texas Agricultural Experiment Station, reports that no bollworm moths emerged from hibernation cages at College Station in April.

Varietal variation in boll weevil damage.--In order to study the effect of boll weevil damage on varieties of cotton producing bolls with thin and thick walls, six varieties of each type were grown at Stoneville, Miss., during the season of 1935 by E. W. Dunnam. Noninfested bolls of known ages of each variety were enclosed for 24 hours in muslin bags, with ten pairs of sexually mature weevils. The weevils were removed and a small paper bag was then tied over each boll to prevent further injury by insects. Bagging began on July 23 and continued daily until August 26, thus providing a sample of about 300 bolls for each variety. When the mature bolls were examined, the average percentage of cotton destroyed and damaged was found to be 34.48 percent and 7.65 percent for the thin-wall group, and 32.63 percent and 6.36 percent for the thick-wall group, respectively. Practically all the bolls up to 4 or 5 days old were destroyed and there was also a high percentage of loss in each variety when exposed to weevils before the carpel lining hardened at about 15 days of age for the thin-hulled group and slightly longer for the thick-hulled group. The maximum ages at which bolls were damaged and destroyed were 37 days each for the thin-hull varieties and 40 and 39 days, respectively, for the thick-hull varieties. The undamaged and weevil-injured locks from the bagged bolls of each variety were ginned separately and then classed by the Bureau of Agricultural Economics. All samples of nondamaged cotton of both groups were classed as three grades above middling. The corresponding damaged samples were all classed one grade below middling.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild cotton eradication.--Excellent progress was made with the eradication of wild cotton in southern Florida during April. This was due to ideal weather conditions. A first clean-up of new colonies was made on 3,364½ acres, from which 38,365 mature and 27,830 seedling plants were removed. A recleaning was made on 6,905-3/4 acres, from which 5,587 mature, 158,915 seedling, and 11,946 sprout plants were removed. With one or two exceptions all of the areas cleaned during previous seasons had been recleaned by the end of the month. Work this season is being carried on with W. P. A. funds and, as larger crews are being used, the men supervising the work have very little time for inspection to determine the present status of infestation. Therefore, as the cotton is eradicated green bolls are collected, placed in a solution of copper sulphate, and sent to the San Antonio laboratory for inspection. Thus far, approximately 3,000 bolls have been inspected and 36 pink bollworms found. All of the specimens were from bolls collected on Key Largo. These inspections cover 11 different localities in five counties of southern Florida.

Thurberia-plant eradication.--The eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona has continued to make satisfactory progress. The latter part of the month numerous plants were encountered. As an example, 43,750 were removed on April 23 and 64,382 on April 28. In some places the plants were so thick that at least a half dozen could be pulled at one time with very little effort, as they were close together and practically unbranched. In other cases, where the plants were more scattered, they were well developed and heavily fruited. They ranged in size from 6 inches to 12 and 14 feet. Many of the plants were infested with the Thurberia weevil, and it is to remove this menace from cultivated cotton that the work is being carried on. During the month 8,260 acres were covered and 353,013 Thurberia plants destroyed with W. P. A. funds.

Trap-plot cotton in the Big Bend.--Due to adverse weather conditions, the trap-plot cotton in the Big Bend area of Texas has been retarded. Conditions have been more favorable the latter half of the month and the cotton is beginning to grow, but not as fast as usual. The trap cotton is one of the control measures used in the Big Bend, the others being field clean-up in the fall and delayed planting of the crop the following spring, so that the majority of moths will emerge before cotton reaches the fruiting stage. This season only one farmer in the Big Bend failed to observe the delayed-planting date of April 15.

Laboratory inspection.--The inspection of green bolls and bollies collected from the 1935 cotton crop is going forward satisfactorily at San Antonio and a number of field stations. None of the material collected outside regulated areas has been found infested. Infestation has been found in material collected within regulated areas from Dona Ana County, N. Mex., and Hudspeth and Presidio Counties, in Texas.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Effectiveness of hydrocyanic-acid gas fumigation against larvae of rhododendron whitefly.--Randall Latta, of the Sumner, Wash., laboratory, in cooperation with A. G. Webb, of the Division of Foreign Plant Quarantines, conducted vacuum fumigation tests early in January against larvae of Dialeurodes chittendeni Laing, on two balled rhododendron plants from a nursery. One of these plants was treated at a dosage of 1/2 ounce of sodium cyanide for a 1-hour period and the other at a dosage of 1 ounce for 1 hour. The gas was introduced into a 15-inch vacuum, which, after 15 minutes, was reduced to 4 inches for the duration of the exposure. The plants were replanted, and subsequent checks showed that none of the larvae survived either fumigation. As a final check, an examination on April 30 disclosed that, although larvae from untreated plants of the same variety had nearly all advanced to the pupal stage, no larvae or pupae were found on the treated plants.

Bees disseminate azalea flower spot disease.--As a result of observations conducted at Charleston, S. C., on insect vectors of the azalea flower spot disease, Floyd F. Smith, of the Beltsville, Md., laboratory, reports that data obtained this year show definitely that bees can disseminate the organism causing this disease. The 1936 observations also demonstrated that favorable conditions of moisture and absence of free-air circulation must prevail for the disease to become serious. These findings corroborate the tentative conclusions reached during investigations performed in 1934 and 1935. A total of 587 tests were made at Charleston with various species of bees, thrips, flies, and beetles. The results indicated that a very small percentage of the insects involved induced infection of the azalea flower spot at the beginning of the season. As the disease became more general on the azaleas, however, an increased percentage caused infection. At the end of the flowering season when the disease was less prevalent on the late flowering varieties, there was a decline in the percentage of the resident insect population that caused infection.

Differences in performance of diluents used with pyrethrum against celery leaf tier.--As a result of recent laboratory tests wherein finely ground clay, tobacco, sulphur, fuller's earth, talc, and a commercial product known as "Celomite" were used as diluents for pyrethrum, applied against quarter-grown and half-grown larvae, respectively, of Phlyctaenia rubigalis Guen., C. B. Wisecup, of the Sanford, Fla., laboratory, reports that no significant differences were shown in the mortality obtained with the dust mixtures containing sulphur, fuller's earth, Celomite, or talc, against larvae of either size, but that the dust mixtures containing clay and tobacco as diluents gave a significantly lower percentage of larval mortality. The diluents alone without the addition of pyrethrum, gave a negligible mortality of the leaf tier larvae, indicating that there was not a measurable difference between the performance of the diluents alone.

The reason for the comparatively low mortalities obtained with the pyrethrum-clay and pyrethrum-tobacco dust mixtures has not been determined, although it is suspected that the differences in the performance of the dust mixtures containing these two diluents, as compared to the dust mixtures containing sulphur, fuller's earth, Celomite, or talc, are mechanical in character, as well as possibly attributable to the arbitrary limits of experimentation set up for this laboratory problem. Further experiments are under way in an attempt to explain more definitely the reason for this extreme variation in the performance of materials commonly or widely used as diluents against the celery leaf tier.

Beet leafhopper survives winter in Montana.--J. R. Douglass and D. E. Fox, of the Twin Falls, Idaho, laboratory, report that surveys in the Billings, Mont., beet-growing district from April 20 to April 23, revealed that a small number of females of Eutettix tenellus Bak. had survived the winter of 1935-36 in that district, and that some of the host plants of E. tenellus had germinated the previous fall. The surviving adults were found near Billings and Warden, practically in the center of the district where the curly-top disease of sugar beets was most prevalent during the 1934 and 1935 seasons. The determination of the fact that even a very few E. tenellus individuals can survive winter conditions in the Billings district is of great importance, as it demonstrates the ability of this pest to survive a moderately severe Montana winter and shows at least a temporary extension of this insect's normal range.

Ability of pea weevil to survive low temperatures without natural protection.--In reporting on the winter mortality of the pea weevil in Idaho during the winter of 1935-36, T. A. Brindley, of the Moscow, Idaho, laboratory, says that of the weevils from cages placed in 22 localities, representing widely divergent conditions in the State, 2.06 percent survived a minimum temperature of -18° F. and that none survived minimum temperatures ranging from -19° to -34°. The weevils used in these experiments were placed in specially constructed cages, where they remained dry but were exposed to all fluctuations in temperature. It should be emphasized, therefore, that the information on mortality obtained in these tests does not necessarily reflect the mortality that would obtain in the field, where the hibernating insects often receive the benefit of protection from the elements by being covered with snow and various types of plant shelter.

INSECTS AFFECTING MAN AND ANIMALS

Specificity of parasitization of two species of parasitic blowflies.--Experiments conducted by E. F. Knipling, of the Valdosta, Ga., laboratory, have shown that larvae of the primary screw worm fly (Cochliomyia americana Cushing & Patton), parasitic on warm-blooded animals, will not develop in cold-blooded animals, such as snakes, turtles, alligators, and others, whereas the larvae of Sarcophaga cistudinis Ald., parasitic on turtles, will not develop in warm-blooded animals, such as sheep and goats.

Species of dipterous larvae collected from cases of myiasis in man and animals in the United States.--Determination by E. F. Knipling of the species of flies of 880 lots of larvae collected from cases of myiasis in man and animals in the United States during 1935 and up to April 1, 1936, by members of the Screw Worm Control Division and others, show that in 87.1 percent of these cases the primary screw worm fly (*C. americana*) was taken in pure culture and in 2.6 percent of these cases this species was taken in association with secondary invaders. In 10.3 percent of the cases only the secondary species were involved. The secondary species involved include *Phormia regina* Meig., *Lucilia* sp., *Cochliomyia macellaria* Fab., *Sarcophaga* sp., *Calliphora* sp., *Musca domestica* L., *Cynomyia cadaverina* Desv., *Stomoxys calcitrans* L., *Hermecia* sp., and in two cases it was impossible to identify the larvae. Of the so-called secondary species, *P. regina* was more often implicated in myiasis than the others. *Lucilia* sp. as a group ranked second in number of cases in which the various species were involved. Species of *Lucilia* taken from wounds were *L. sericata* Meig., *L. caeruleiviridis* Macquart, and *L. cluvia* Walker. *C. macellaria* ranked third in number of cases in which this species was taken. *Sarcophaga* species as a group was fourth. Specimens were examined from a total of fifteen cases of myiasis in man. The species and number of cases in man in which each was involved were as follows: *C. americana*, 7; *L. sericata*, 2; *Sarcophaga bullata* Park., 2; *Phormia* sp., 1; *C. cadaverina*, 1; *M. domestica*, 1; and undetermined species, 1.

Notes on the biology of the Gulf coast tick.--Observations made by Homer Hixson, Valdosta, Ga., on the life history of *Amblyomma maculatum* Koch show that the unfed larvae are able to survive for approximately 4 months under natural conditions and approximately 5-1/2 months in the laboratory. The eastern meadow lark is an important host of the immature stages of this tick, and examination of a number of these birds showed that no larvae were present on them after February 26, although 79 percent of the birds examined in April were infested with nymphs. The first activity of the adult tick was noted on April 17. These observations were made in Georgia and Florida.

Resistance of pupae of the primary screw worm fly to low temperature.--Experiments conducted by C. N. Smith at Washington, D. C., show that 82.5 percent of the pupae of *Cochliomyia americana* were able to resist a temperature of 14° F. for 48 hours when buried in dry sand, and 70 percent survived the same temperature when exposed for the same length of time buried in wet sand.

Electric fly traps caught fewer blowflies than Government cone-type trap.--Preliminary experiments conducted by O. G. Babcock, at Sonora, Tex., to determine the relative efficiency of an electric screen-type trap as compared to the standard Government cone-type trap, show that during a period of 10 days the electric trap caught a total of 16.6 quarts of blowflies, as compared with 20.5 quarts for the Government cone-type trap.

SCREW WORM CONTROL

Early cases of screw worms.--W. E. Dove reports that throughout the winter months screw worms were present in wounds of animals in Florida and in the southern portion of Texas. During January, February, and March, 4,598 cases of screw worms were reported from the peninsula portion of Florida and there was some activity in the more northern counties. During the week ending April 11, 638 cases were reported from the State, of which 408, or 63.95 percent, occurred in navels of newly born animals. For the week ending

April 18 there were 1,392 cases, of which 1,070, or 76.87 percent, occurred in the navels of young animals. During April cases were reported from Florida as far north as the Georgia boundary line, including Nassau County on the East and Escambia County on the West. The occurrence of small numbers of screw worm cases in the southern portion of Texas and comparable numbers in the lower portion of the goat and sheep area shows that there is a gradual building up of a screw worm population which extends over most of the counties south of Edwards Plateau. During January and February screw worm cases were present in Brooks County, in Falfurrias County during the first week of March, and in Kleburg County on March 15 and also during a warm period on April 9. Brazoria, Matagorda, Jackson, and Calhoun Counties reported no screw worms in dehorned animals and wounds. Stockmen report that cases normally appear in these counties about May 1. On April 10 and 13 screw worms were observed in navels of young animals and in brand wounds in Jim Wells County. On one ranch 10 cases were found in 1,000 cattle. On April 16, screw worm cases were becoming numerous in the northeastern part of Bee County. In the southern counties of Texas there is a tendency among ranchmen to overlook or neglect treatment of early cases. They know that animals infested early seldom become reinfested and that such animals usually get well without treatment. This neglect of early cases permits an increase of screw worm flies during the early part of the season and suggests a very definite procedure in control of the pest. In South Carolina, Mississippi, Louisiana, and Alabama considerable scouting is being done, but only one case of true screw worms was reported. This occurred at Clayton, in Barbour County, on April 24. In the Southeastern States pine tar oil is being supplied to county agents so that it can be demonstrated for prevention of screw worm infestations.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Forty-six living larvae and seven living pupae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were intercepted at New York on January 4 in four grapefruit in stores from Sicily. A living specimen of the lygaeid *Geocoris thoracicus* Fieb. was found at El Paso, Tex., on February 3 on a chili pepper in cargo from Oaxaca, Mexico. Nine living larvae of *Pyrrhidium sanguineum* L. were taken at New Orleans on January 2 in an oak log in cargo from England via the Netherlands. This cerambycid is found in oak in Europe. The scale insect *Leucaspis cockerelli* (de Charm.) was intercepted at Philadelphia on October 28, 1935, on the leaf and stem of a palm (*Kentia* sp.) plant in ship's furnishings from Brazil. A living specimen of the fulgorid *Cenchrea brunnea* Mc.A. was found at Gulfport, Miss., on January 28 on a banana in cargo from Mexico. A living specimen of the coccid *Ceroputo barberi* (Ckll.) was intercepted at San Juan, P. R., on December 2, 1935, on a plant *Cestrum hortulanum* in baggage from St. Thomas, American Virgin Islands. A living adult of the chrysomelid *Ctenochira punicea* Boh. was taken at Brownsville, Tex., on February 11 on a gardenia in cargo from Mexico. A living larva of *Platynota rostrana* Walk. was found at New Orleans on February 18 in a pepper pod in cargo from Cuba. This tortricid is recorded from Florida and Texas. Living larvae and pupae of the agromyzid *Napomyza lateralis* Fallen were intercepted at New York on March 27 and 30 in endive leaves in cargo from Belgium. A living adult of the chrysomelid *Diabrotica theimei* Baly was found at Nogales, Ariz., on January 9 on a bell pepper in cargo from Sinaloa, Mexico. Dead adults of the bruchid *Acanthoscelides spinipes* Er. were taken at Washington, D. C., on December 12, 1935, in and with legume seed in the mail from Greece. The cattleya fly (*Eurytoma orchidearum* Westw.) was intercepted at San Francisco on January 20 on an orchid (*Cattleya mossiae*) in cargo from Venezuela. This eurytomid was presumably introduced into greenhouses of the United States from Colombia about 1890.

Pathological interceptions of interest.--A *Galanthus* bulb from Holland intercepted at Philadelphia on September 23, 1935, was infected with *Ascochyta* sp. Apparently no species of *Ascochyta* has previously been reported on *Galanthus*. *Aspergillus* sp. intercepted at Mobile on August 23, 1935, on garlic bulbs from France, resembled *A. alliaceus* Thom and Church in general appearance of sclerotia and conidia, but the heads were abundant instead of scattering, as in the named species. *Diplocarpon rosae* Wolf was intercepted from the Dominican Republic for the first time on April 22 at San Juan. Our first interception of *Exoascus betulinus* (Rostr.) Sadeb. witches' broom of birch was made at New York on March 19 in a bundle of cuttings in baggage from Germany. *Gloeosporium taxicolum* Allesch was intercepted for the first time on October 27, 1935, at New York in yew cuttings from Ireland. *Leptosphaeria culmicola* (Fr.) Karst. was intercepted for the first time on January 14 at New York in wheat straw from France. *Leptosphaeria* sp. intercepted at New York on November 11, 1935, in rice straw and hulls from Puerto Rico does not agree with described species on the host. *Marsonia* sp. on grape leaf from England found in stores on October 15, 1935, at New York does not agree with species reported for the host. Our first interception of *Metasphaeria cocoes* Petch was made at New York on September 23, 1935, on coconut from the Dominican Republic. *Phoma betae* (Oud.) Frank on beet was intercepted from Sweden for the first time on April 16 at Norfolk. *Phomopsis cocoes* Petch on coconut was intercepted from Puerto Rico for the first time on September 23, 1935, at New York. Our first interception of *Phyllosticta nigromaculans* Sacc. was made on September 19, 1935, at Washington. *Phyllosticta* sp., perhaps *P. sophorae* Ell. & Ev., was intercepted at Hidalgo on March 5 on *Sophora secundiflora* from Mexico. *Phyllosticta* sp., perhaps a new species, was intercepted on *Stapelia cooperi* from South Africa on April 24 at San Francisco. Our first interception of *Puccinia lippiae* Speg. was made at Roma on April 10, the host being *Lippia wrightii* from Mexico. *Rhabdospora* sp. was intercepted on peony for the first time on October 31, 1935, at Seattle on nursery stock from Japan. An undetermined species of *Sclerotium* was intercepted on September 18, 1935, at New York on *Galanthus* bulbs from Turkey. *Stilbum incarnatum* Wakker was intercepted on *Pachyrhizus erosus* for the first time on September 26, 1935, at San Francisco in cargo from China. *Ustilago caricis* (Pers.) Unger was intercepted for the first time on April 11 at Seattle in carex seed from Norway. *Vermicularia* sp. was intercepted on iris for the first time on March 25 at Seattle on *Iris rosea* from Japan.

DOMESTIC PLANT QUARANTINES

Citrus canker inspection increased.--The inspection carried on regularly in cooperation with State inspectors for citrus canker is now being concentrated on an intensive search for the disease in the entire area throughout the Gulf coast region from Houston, Tex., south to the Rio Grande. Trained inspectors transferred from the date scale project, now approaching completion, have also recently been assigned to the work. The search for citrus canker in the Houston-Galveston-Beaumont area of Texas since the first of the year has included the reinspection of three counties found infected in 1935, and the inspection of seven other counties in the vicinity. No canker has been found thus far outside those counties known to be infected in 1935, and of the five properties where canker has been found in 1936, one in Galveston County and one in Jefferson County were known to be infected in 1935. Two other infected properties have been found thus far in Galveston County, and one in Harris County.

White pine nursery inspection in progress.--It is expected that the inspection of the sanitation zones surrounding the five-leafed pine nurseries whose owners have applied for shipping permits for the coming fiscal year will be completed by the close of May in New England, the Appalachian area, and the Middle West. Similar work is under way in Oregon, Washington, and Montana. The search for currant or gooseberry plants is being accomplished early in the spring when these plants are easily detected because of their habit of leafing out earlier than most other vegetation. Nurserymen state that there is an inadequate supply of both white pine planting stock and white pine seed. This insufficiency is reported to be the result of the increased interest in planting and of the use of such stock in reclaiming waste lands and denuded areas, as well as for preventing soil erosion.

S. C. S. applies blister rust sanitation measures in 13 nurseries.--Applications for pine-shipping permits under the provisions of the white pine blister rust quarantine have been received from the Soil Conservation Service for 2 nurseries in Pennsylvania, 3 in New York, 1 each in Virginia, Ohio, Iowa, Minnesota, Wisconsin, and Oregon, and 2 in Washington. In addition, the S. C. S. is establishing Ribes-free zones around several nurseries in noninfected States.

Activities on phony peach disease control outlined.--A plan of operation under which phony peach disease control work will be furthered in the 1936 field season has been discussed with quarantine officials of the infected States and an outline has been drawn up for the use of each of the State leaders, analyzing the conditions in each State and detailing the type of work to be done in given areas. These types of work include inspection of commercial orchards, home orchards, and nursery environs, establishment of eradication areas, and a survey of the counties bordering on the known infected areas to determine whether the disease is spreading.

Country-wide plant shipments intercepted.--Shipments in violation of Federal domestic plant quarantines were consigned to every State in the Union except Delaware, Louisiana, and New Mexico in March or April, as shown by reports of transit inspectors. Of the 629 shipments intercepted by transit inspectors at terminal railway points and turned back to senders in these 2 months, 99 had been consigned to New York, 51 to Ohio, 48 to Pennsylvania, 47 to Illinois, 30 to Michigan, 26 to Nebraska, 25 to California, 22 to Florida, 21 to Minnesota, 21 to Virginia, and 10 or more each to Connecticut, Idaho, Indiana, Maine, Missouri, New Jersey, Oregon, Vermont, and Wisconsin. California State inspectors also reported the interception of 5 such violations in this period.

Work resumed on peach mosaic project.--Field work on the relief project relating to the peach mosaic disease in Colorado, temporarily suspended last fall because of weather conditions, was resumed on April 20. Five crews on survey work in Mesa County located nearly 7,000 infected peach trees in 10 days. Laborers accompanying the crews cut the infected trees as fast as they were located, and other crews following later burned the stumps. A cooperative survey for the peach mosaic disease is under way in Texas and is being extended to other States, including the inspection of places in Kansas and Iowa to which budded wood was shipped from the infected area in Colorado a few years ago.

States issue quarantines on peach mosaic disease.--Under quarantines recently issued by these States, peach nursery stock may not be shipped to California, Colorado, or Oregon from counties infected with the peach mosaic disease.

INSECTICIDE INVESTIGATIONS

New apparatus for measuring particle size of insecticidal dusts.--L. D. Goodhue and C. M. Smith, Washington, D. C., have designed and constructed a new apparatus for the determination of the rate of settling of the particles of a powder in a liquid medium, from which the relative amounts of particles of various sizes can be deduced. The apparatus is in effect a differential manometer that measures the change in density of the suspension as the particles settle out. The differential effect is obtained by working in a two-tube closed liquid system, consisting of two immiscible liquids differing slightly in specific gravity, the lower of which serves as the suspending medium for the powder. Studies of calcium arsenate and paris green are under way.

Method for estimating nicotine concentrations during fumigation.--There has been need of a method of determining nicotine in the atmosphere of fumigating chambers. To this end the silicotungstic acid method for the determination of nicotine has been adapted to a micro scale by J. R. Spies. Because of the small quantities of nicotine that may have to be determined, it was necessary to determine the solubility of nicotine silicotungstate in dilute HCl and to study the optimum conditions for precipitation. Pure nicotine silicotungstate was prepared and its solubility in dilute HCl from a pH of 1 to 6.6 was determined. Starting at 0.1 N, the solubility drops on to a smooth curve to 0.03 N; here a sharp break is found between 0.03 and 0.02 N, and then a gradual decrease to 0.001 N. In water (pH 6.6) the solubility was greatest, being approximately 0.0568 mg/ml; at 0.001 N the solubility was 0.0051 mg/ml. The results obtained are to be incorporated in a paper for publication. The experiments made to date indicate that as little as 0.05 mg nicotine in 10 ml of dilute hydrochloric acid can be determined with an error not much greater than 1 percent. Apparatus has been designed and constructed for studying the absorption of nicotine from the air. In trial experiments it has been found that complete absorption of nicotine can be effected in 1.5 ml of 1 N HCl in one absorber with gas velocities as high as 500 ml/minute. Several analyses of actual fumigation have been run, and only about one-tenth the expected nicotine found; laboratory experiments are now under way to determine the probable cause of the low results.

Liquid hydrocyanic acid may contain sulphur dioxide.--L. B. Howard, during the course of a field fumigation of citrus near Whittier, Calif., detected the presence of sulphur dioxide in the fumigating gas. It was subsequently ascertained that one of the two producers of liquid hydrogen cyanide in this region employs sulphur dioxide as a stabilizer. Considering the destructive action of sulphur dioxide on foliage in general, it was thought desirable to determine the amounts present in the cyanide at different times, that is, when different shipments of the liquid were employed. In a series of ten determinations, it was found that the quantity of sulphur dioxide in different batches of the liquid ranged from 5.6 to 16.0 percent by weight. It is not improbable that occasionally the concentration of sulphur dioxide might reach a value definitely harmful to the citrus tree.

BEE CULTURE

The place of pollen reserves in early package colony development.--C. L. Farrar, of the Intermountain Bee Culture Field Laboratory, Laramie, Wyo., reports as follows: "The results of experiments with pollen reserves on the surviving population of overwintered colonies suggest a need for data on pollen reserves for starting packages with two possible applications: First, it is possible that colonies lacking in sufficient pollen reserves in the fall for successful wintering may be economically destroyed in the fall and replaced with packages sufficiently early to utilize what reserve pollen was present in the combs of the destroyed colonies; or, second, to lend greater emphasis to timing properly the establishment of packages with the pollen supply instead of depending on a particular date which may be right one season but improper at another."

Food of mature and immature worker bees and queens.--Another phase of research directed toward the solution of the supersedure problem is the physiological work on the food of mature and immature worker bees and queens. This work is under the direction of R. M. Melampy, assistant apiculturist at the Southern States Bee Culture Field Laboratory, Baton Rouge, La. This work is gradually getting under way and will be closely correlated with the queen-yard work of E. Oertel and the genetics work of Otto Mackensen at the same laboratory.

Relation of nutrition to dimorphism of female bees.--Mr. Melampy also states: "It has been reported that 'royal jelly' contains vitamin E, which is responsible for the differences existing between the worker and queen bees. This is to be reinvestigated by feeding 'royal jelly' to rats. The lack of vitamin E causes a permanent sterility in rats and in the female the condition is temporary. Female sterility can be cured with extremely small quantities of vitamin E."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A cactus-feeding beetle from Texas.--W. S. Fisher has identified as Parmenosoma griseum Schaeff. five specimens of a cerambycid submitted for determination by the Division of Insects Affecting Man and Animals. They had been taken at Cotulla, Tex., on April 24 by Gradin Barnett, and were said to be a cactus-feeding species. Nothing was previously known concerning the habits of this form, which up to this time has been represented in the collections of the National Museum only by the holotype specimen.

New records from nests of the cut ant.--The Division of Cereal and Forage Insect Investigations has submitted for identification certain insect material collected by E. V. Walter in nests of the cut ant Atta texana Buckley at San Antonio, Tex. Among this material is a series of 15 specimens identified by Alan Stone as a new species of Phlebotomus belonging to the subgenus Neophlebotomus. This is the first record of a species of this subgenus from the United States. Only two species of Phlebotomus have been known to occur in this country, both belonging in the subgenus Brumptomyia. The specimens of the new species were found in the nest to a depth of 8 feet, and, according to Mr. Stone, it is not improbable that they were breeding in this situation. It would be of interest and importance to know the hosts of this species. One female and two male moths, also contained in this material from nests of the cut ant, have been determined by August Busck as Amydria confusella Dietz, a species of Tineidae. There have been no previous observations on the behavior of species belonging to this genus. The presumption that the species is a true myrmecophile, and possibly even myrmecophagous, is warranted, in view of the relationship of Amydria to certain other myrmecophilous genera in the family. However, this remains to be demonstrated by actual observation of the immature stages.

An egg parasite of the black widow spider.--Recently there was received for identification from the Division of Cereal and Forage Insect Investigations a series of specimens reared from eggs of the black widow spider at Wichita, Kans., by H. H. Walkden. Shortly after this, several additional specimens of the same species, also reared from the eggs of that spider, were submitted by W. J. Baerg, of the University of Arkansas. C. F. W. Muesebeck has identified the parasite as a new species of Baeus, a genus of Scelionidae the species of which appear to be exclusively parasitic on spider eggs. This appears to be the first record of an egg parasite of the black widow.

Additional North American record for a European leafhopper.--Doratura stylata Boheman, a European leafhopper, was first recorded from North America in 1924 (Psyche 31:170), when C. W. Barber reported the capture of three specimens in Massachusetts. Additional specimens identified as this species by P. W. Oman were recently received for determination from R. H. Beamer, of the University of Kansas, and were collected by M. W. Sanderson at Plymouth, Mass., and Jerome, Mich. There is no evidence to indicate whether the Michigan record represents a normal spread of the species or whether it was introduced there. D. stylata, like the species of the American genus Athysanella which it resembles, is a grass feeder so far as is known.

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FOR MAY 1936

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ADMINISTRATION

Grasshopper control campaign.--On June 24 the President approved a Joint Resolution, passed the last day Congress was in session, providing an appropriation of $250,000 for a cooperative campaign for grasshopper control. The amount is not sufficient to provide bait in all areas where grasshoppers occur in outbreak numbers. In many sections grasshoppers have moved into the fields and fully effective control cannot be expected; however, by the prompt utilization of the bait, protection can be given to crops in certain areas. The appropriation will be used for the purchase of bait materials and for their distribution to appropriate centers in the infested areas, where State agencies and farmers will be responsible for mixing the bait and for its local distribution and utilization. Field headquarters for the work have been established at Kansas City, Mo., under the direction of P. N. Annand.

Investigations in Puerto Rico to continue.--Studies were begun last summer on a number of insect problems in Puerto Rico. It was contemplated that the work would be concluded by the end of the fiscal year. After the Supreme Court decision of January 6 on the A. A. A., restricting the use of Processing Tax funds, the activities were curtailed for about 3 months, but were continued later under a special appropriation. With the interruption, it was impracticable to carry out all the work planned, and the remainder of the special appropriation will be used to continue certain activities during part of the next fiscal year. Investigations on the following problems are being concluded with this fiscal year: The relation of ants to scale insects attacking coffee, conducted by M. R. Smith; studies on insect vectors of sugarcane diseases, by S. R. Vandenberg, F. M. Wadley, and H. D. Tate; studies on insects attacking corn, by B. A. App, under the direction of S. R. Vandenberg; mosquito studies by G. S. Tulloch; and explorations for natural enemies, by S. M. Dohanian. The studies on the Puerto Rican mole cricket were terminated in April, when A. H. Madden was transferred to Quincy, Fla., to assist in investigations on tobacco insects. Investigations on the following problems are not to be concluded at this time: Colonization of natural enemies, by K. A. Bartlett; studies on cotton insects, particularly the pink bollworm, by L. C. Fife; on the rhinoceros beetle attacking coconuts and mealybugs on pineapples, by H. K. Plank; on bean pod borers and onion thrips, by L. B. Scott; and on the horn fly and screw worm, by H. L. Dozier. The investigations on fruit flies will be continued without reduction at least for the first quarter of next fiscal year.

FRUIT INSECT INVESTIGATIONS

Results with codling moth bands.--M. A. Yothers, of the Yakima, Wash., laboratory, reporting on last season's work with chemically treated bands for codling moth control, states that the tests included comparisons of different loads of beta-naphthol and oil, of cold-treated and hot-dipped bands, oils of 100 and 300 seconds viscosity, crude and technical beta-naphthol, and the addition of aluminum stearate. With the exception of a single test of a band treated with 0.32 ounce of crude beta-naphthol in 300-viscosity oil, which gave unusually poor results, the following conclusions were reached in these experiments: A much higher percentage of kill than usual was obtained in all of the lower chemical loads; approximately 98 percent kill or better was obtained with chemical loads of 0.30, 0.31, and 0.32 ounce per 100 linear feet of 2-inch band; comparable chemical loads of light and heavy oil are approximately equal in killing value; comparable chemical loads of hot-dipped and cold-dipped bands are approximately equal in killing value; comparable chemical loads of crude and technical beta-naphthol appear about equal in killing value; the addition of aluminum stearate in these tests gave no significant advantage. In another series of experiments to determine the proportion of mature codling moth larvae captured in bands, five Jonathan and five Delicious apple trees were scraped thoroughly and banded with chemically treated bands in June 1935. All debris, such as is ordinarily found in semicover-cropped orchards, was left undisturbed throughout the season. Examinations of thinnings, for emergence holes of larvae, were made. Dropped fruit and fruit on the trees were also examined at intervals throughout the season, and harvested fruit at the close of the season. At the time of these examinations the bands were also examined, removed, and replaced by new bands. At the close of the season it was found that of the larvae leaving the fruit about 81.7 percent had been captured in the bands and killed. These figures are somewhat higher than the average reported from similar experiments, and probably represent the maximum efficiency that can be expected from banding.

The use of small immature apples for breeding fruit moth larvae.--H. W. Allen and Earl Lott report that during the several years of breeding large stocks of larvae of the oriental fruit moth (Grapholitha molesta Busck) at Moorestown, N. J., for parasite propagation, apples have proved to be the most satisfactory food. However, the full-grown marketable fruit is not uniformly satisfactory, as it tends to decay rapidly and to overwhelm the partly grown larvae in a mass of watery pulp. This is particularly true of apples wintered in cold storage and used early in spring, and for early fall apples used at a season when temperatures are too cool for maximum larval development, but not cold enough to retard decay. For several years the laboratory has been using small immature apples in host breeding work and such fruit is now being used, almost to the exclusion of mature marketable apples, at all seasons of the year. During the summer months, larvae grow very rapidly in this medium, and rot rarely reduces the production in any unit lot. The ratio of cocoons produced to the number of eggs used has been fully as high as in mass production at any season of the year. The immature apples being used are the fruit picked and discarded when apples are being thinned, and range from 3/4 inch to 1 1/2 inches in diameter. When considerable quantities are to be used and long storage is required, the apples are picked directly into bags, kept out of the hot sunlight, and chilled the day they are picked. If these precautions are observed, the fruit will keep well in storage. There has been some difficulty in storing this immature fruit over winter at Moorestown. This year, however, fruit picked and chilled, as indicated above, and wrapped in paper toweling, was carried through the winter in excellent condition, in commercial cold storage for apples (32° F. and 85 to 90 percent humidity). Approximately 100 percent of those not wrapped, and 50 percent of those wrapped in waxed paper, rotted in storage. Before the apples are used they are washed in a 1-percent hydrochloric acid solution to remove any excess arsenical residue, which is usually heavy on these small apples.

Flight of Blapstinus rufipes Casey.--Dwight F. Barnes and Charles K. Fisher, of the dried-fruit insect laboratory at Fresno, Calif., observed this species in flight in considerable numbers on the afternoon of March 19. The air temperature was 75° F. At the same time the species was plentiful on the ground, crossing a road from a recently plowed fig orchard toward a field of barley. The beetles in the air were moving in the same direction, at elevations of from 4 to 25 feet. No previous observation of the flight of these small darkling beetles had been made, and attempts by Heber C. Donohoe to induce flight in the laboratory had been unsuccessful. B. rufipes adults occasionally cause loss by feeding on figs on the ground. In 1935 this infestation was heavier than usual.

Milky disease of Japanese beetle larvae in the field and its soil-temperature relationships.--S. R. Dutky, Moorestown, N. J., reports that the spring build-up in the type A milky disease was observed starting on May 18. From the soil thermograph records at the Moorestown laboratory, 331 hours of temperatures of 60° F. or higher at the 1-inch level occurred up to this date. The average of these temperatures was 64.7°. The time required for the development of gross symptoms of type A milky disease at this temperature as calculated from the time-temperature relationship found experimentally with grubs inoculated by direct injection is 322 hours. Last year 311 hours of temperatures 60° or higher were required for the appearance of the disease with an average temperature of 65°. The average temperatures referred to were obtained by taking the arithmetic mean of mean hourly temperatures 60° or higher.

Colonization of imported parasite of Japanese beetle.--T. R. Gardner, M. H. Brunson, and L. B. Parker, Moorestown, report that during the period from May 12 through May 27 a total of 157 colonies of Tiphia vernalis Roh. were liberated in the Japanese beetle-infested area in the States of New Jersey, Pennsylvania, Delaware, Maryland, Connecticut, New Hampshire, and Rhode Island. These colonies, each consisting of 100 females collected in the field, were liberated in pastures, golf courses, estates, lawns, and other places where previous sample diggings showed grub populations sufficiently dense to warrant liberation. The colonization in New Jersey, Pennsylvania, northern Delaware, and northern Maryland covered the periphery of recent beetle infestation from above New Brunswick, N. J., to below

Wilmington, Del. Colonizations in central Delaware, central Maryland, Connecticut, New Hampshire, and Rhode Island were made at points where isolated infestations of the beetle have become sufficiently large to warrant liberation of this parasite.

MEXICAN FRUIT FLY CONTROL

Fruit fly data from the lower Rio Grande Valley.--Although more than 33,000 trap inspections were made by inspectors of this project during May, only one adult Anastrepha ludens Loew was taken in Texas. Seven adults were trapped in the border cities of Mexico within the same period. As there is no fruit on the American side of the border suitable for oviposition, no fruit fly larvae were found. Mangoes being received at the Mexican markets in Matamoros and Reynosa were found to be infested and considerable fruit was confiscated by the Mexican authorities. Present indications are that this area will produce the largest crop of citrus in the history of the valley.

DATE SCALE CONTROL

Eradication now complete.--Fan-palm inspection was completed in the Coachella Valley during the month and the inspectors were transferred to other projects. This completes the eradication project in the Coachella Valley. In the Imperial Valley clean-up work was completed and spot inspection continued.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Hessian fly status in Kansas and Missouri.--E. T. Jones, of the Manhattan, Kans., laboratory, reports that dissection of plants collected on May 4 from eight fields known to be severely infested last fall has shown light infestations resulting from the principal emergence of hessian flies of the first spring brood in southeastern Kansas and southwestern Missouri. This light infestation was probably the result of dry weather during the emergence of the first part of the spring brood. Low humidity retarded oviposition, desiccated eggs, and interfered with larval migration. Stem infestation averaged 9 percent, with a range of from 0 to 58 percent. The average intensity was 4.7 forms per infested stem. Of these forms 91 percent were young larvae, principally of the first and second instars. Indications are that there will be no general second spring generation of hessian fly in southeastern Kansas and southwestern Missouri this year.

Grasshopper outbreak in California.--C. C. Wilson, of the Sacramento, Calif., laboratory, reports that a general outbreak of Melanoplus devastator Scudd., Oedaleonotus enigma Scudd., Hippiscus californicus Scudd., and Camnula pellucida Scudd. has been reported in the dry-land and foothill areas in San Joaquin, Sacramento, Placer, Butte, and Tehama Counties. Inspection of Sacramento County on May 29 indicated 100 square miles infested. The grasshopper populations ranged from 1 to 225 per square yard. General damage to shade trees and to garden and truck crops was noted. The stages represented ranged from second instar to adult, the fourth and fifth instars predominating, which would indicate that more serious injury to cultivated crops may be expected.

Flight of June beetles in southern Wisconsin.--T. R. Chamberlin and Lee Seaton, of the Madison, Wis., laboratory, report that the first flight of June beetles was observed in Wisconsin by members of the Madison laboratory staff on May 6 at Gays Mills, although some beetles were taken from beneath leaves early in April. With the exception of *Phyllophaga tristis* Fab., beetles have been scarce. *P. tristis* has been found in great numbers at Lamont, Waunakee, and Edgerton and was more or less abundant elsewhere. Oaks stripped or partially stripped have been observed in various localities in Dane and Lafayette Counties. Damage to oaks has also been reported from Dane and Waushara Counties and to raspberries in LaCrosse County..

Corn ear worm adults appear early in Kansas.--R. T. Cotton, Manhattan, Kans., reports that the first adults of the corn ear worm were taken in the Manhattan and Garden City light traps on April 27. In comparison with the 1935 record, this date was 3 weeks earlier for Manhattan and 4 weeks earlier for Garden City. The total number of adults taken up to June 6, 1936, was five times as great as during the same period in 1935.

Parasitization and disease in cutworms.--Mr. Cotton also states that several lots of cutworm larvae, collected from various localities in Kansas and Nebraska, have been reared to determine the extent of parasitization and disease. The recent outbreak of the pale western cutworm, which caused the most extensive damage on record in Kansas, afforded an excellent opportunity to observe the effect of parasites on this species. The following table presents the comparative data on parasitization and disease in cutworms for 1935-36.

Species	1936		1935	
	Parasitized	Diseased	Parasitized	Diseased
	Percent	Percent	Percent	Percent
Army cutworm (*Euxoa auxiliaris* Grote)	20	20	14	56
Pale western cutworm (*Agrotis orthogonia* Morr.)	9	32	(1)	(1)
Dingy cutworm (*Feltia ducens* Walk.)	4	5	3	10
Euxoa sp.	6	4	(1)	(1)

[1] No record.

Broad-horned flour beetle spreading.--Geo. B. Wagner, Manhattan, reports that the broad-horned flour beetle (*Gnathocerus cornutus* Fab.) was taken in Minneapolis, Minn., in one of the large mills the latter part of May. The adult beetles were estimated to comprise from 1 to 3 percent of the total insect population of the milling streams. This estimation was based on insects collected from milling stock cleaned from the elevator boots prior to fumigation. The occurrence of this species in the northwestern milling area is comparatively rare. This observation and a record of its occurrence in Kansas City, Mo., in 1934 seem to indicate a spread of this insect through the interchange of flour between milling units in different sections of the United States.

New piping system gains favor with milling industry.--Mr. Wagner says that the system recently developed for piping liquid hydrocyanic acid gas directly into the milling machinery through a system of copper tubing and pressure nozzles will be installed in 15 milling units this year. This makes a total of 25 milling companies that have adopted and are finding this new method satisfactory. Mills using this system have eliminated the costly clean-up preceding fumigation and the costly assembling of the milling machinery after fumigation. These milling units are now able to have two fumigations each year for approximately the cost of one fumigation by the old method of introducing the gas into the open space.

JAPANESE BEETLE CONTROL

Scouting-trap supply reaches 100,000.--Manufacture of 84,000 green-and-white Japanese beetle scouting traps was begun at the New Cumberland, Pa., warehouse on May 23. Power presses and other machines were run 24 hours per day. Use of galvanized supporting rods will eliminate the necessity for annual painting, as was required with iron rods. With the addition of the newly manufactured traps, the division's supply will number 100,000. The first model of the new-type trap was built in the fall of 1934. Since that time a joint patent covering certain new construction features has been issued to Donald Armstrong, of the New Cumberland station, originator of the collapsible features of the scouting trap, and F. W. Metzger, of the Japanese beetle laboratory, who patented the unique features of the original standard trap developed at the laboratory. Special jigs were developed to produce the trap economically on a 20-ton power press. One experienced man can manufacture approximately 475 complete traps per 8-hour day. The principal improvements in the new-type trap are lightness in weight, collapsibility, and cheapness of manufacture. The customary set-up for a typical community is 400 traps. Such a shipment of standard traps weighs 4,000 pounds and occupies 207 cubic feet. A similar set-up of scouting traps weighs only 826 pounds and can be packed in 8-1/3 cubic feet of space. The space required for 400 standard traps will accommodate 9,920 scouting traps. The scouting trap, which is slightly smaller than the standard trap, is packed knocked-down, minus rods, in two boxes. One box contains the cones, baffles, and "S" hooks. The second box contains the beetle containers and bait-dispensing blocks. This year's scouting traps will be manufactured from coated black plate in the recommended green-and-white color combination. The paint on the plate purchased is resistant to the action of the geraniol-eugenol bait. The total cost per trap assembly, including bait and bait dispenser, is approximately 18 cents.

Cooperative nematode experiments for Japanese beetle control.--Under a tentative agreement with the New Jersey Department of Agriculture, the Bureau will cooperate with the State laboratory at the Japanese beetle quarantine headquarters of the White Horse district in experiments to determine the effectiveness of the nematode Neoaplactana glaseri in eradicating established infestations of the Japanese beetle. Plans are being made for experimental work on the use of nematodes in connection with the treatment of potted plants to free the soil of larval infestation and render the plants eligible for certification. A few preliminary experiments indicate possibilities of such a treatment being successfully developed.

Soil Conservation nurseries add to inspection.--Establishment of several nurseries of the Soil Conservation Service in the central Pennsylvania territory has added considerably to the inspection work. So far this season, 700,000 black locust trees, 50,000 honeysuckle, and 100,000 coral berry bushes have been inspected and certified for shipment to New York and West Virginia. Several other nurseries of the Soil Conservation Service are being started and will be scouted this summer with a view to establishing their freedom from Japanese beetle infestation and their assignment to a preferred status.

High waters uncover corn borer infested stalks.--High waters in the Saco River in the town of Fryeburg, Maine, washed out a great many cornstalks that were plowed under last fall. European corn borer infestation is quite heavy in this section, therefore the exposure of large quantities of infested stalks is quite a serious problem to the farmers who market their corn at canning factories. Ears noticeably injured by corn borers are refused by the canners.

Corn borer scouting report available.--Distribution to State plant quarantine officials has been made of a report detailing the results of the scouting performed with W. P. A. labor during 1935 to determine the extent of spread of the European corn borer. Any interested official may obtain a copy of this report by addressing the field headquarters at Bloomfield, N. J.

Gypsy moth road stations discontinued.--Operation of gypsy moth vehicular inspection stations on the boundary of the generally infested area was discontinued on May 15 due to exhaustion of W. P. A. funds allotted for this work. From April 1 to May 15, inspectors at the road stations intercepted 94 shipments en route in violation of the satin moth quarantine and 16 shipments in transit contrary to the blister rust quarantine. Many of the white pines intercepted were badly infected with the blister rust. Inspection of a load of cordwood intercepted while en route from Wolfeboro, N. H., to New York City disclosed 20 gypsy moth egg clusters.

Schools inaugurated to train Dutch elm disease scouts.--With W. P. A. funds allotted to Dutch elm disease eradication work rapidly approaching exhaustion, the force of relief workers was drastically reduced on May 1. Relief workers with previous scouting experience and those whose work during the winter sanitation campaign indicated their adaptability to scouting work were retained and given opportunities to qualify a scouts. Most of the other relief workers were dismissed. Scout schools were inaugurated on May 16.

The initial enrollment in five New Jersey schools was 112 men. By May 23 the enrollment had increased to 260 men. In New Jersey it was necessary to release 79 W. P. A. workers who were unsuited for summer scouting. All New York W. P. A. workers were laid off on May 16, and the men who had proved their adaptability to scout work were told to report at scout school on May 19. A scout school in Rockland County, N. Y., started on May 25. Most of the men who trained in Rockland County were already experienced in this phase of the work. Approximately three-fourths of the men in training at White Plains had some experience in scouting for the disease.

Distant scouting for Dutch elm disease started.--Scouting was started during the week ending May 16 in all the outlying areas except Boston. Work will be performed at Baltimore and Brunswick, Md.; Philadelphia and the Delaware River area in Pennsylvania; Norfolk and Portsmouth, Va.; Knoxville, Tenn.; New Orleans, La.; Louisville, Ky.; Cincinnati, Dayton, Piqua, and Cleveland, Ohio; Indianapolis, Ind.; Chicago, Ill.; and Kansas City, Mo. The Boston work will start about June 1.

Cooperative experimental work.--Surveying and tree tagging are now progressing rapidly in New Jersey in cooperation with the Morristown laboratory. The experimental plot in Montclair was completed, with 429 elms tagged in this plot. Another plot at Maplewood was also completed. One New Jersey crew, working under the supervision of the laboratory, took trunk samples of all elms on the East Orange Water Reserve.

Elm wilting observed late in May.--Foliage wilting and wood discoloration apparently characteristic of Dutch elm disease infection were found on May 22 in connection with clear-cutting operations in Ashbrook Swamp in the New Jersey infected zone. Laboratory diagnosis of the tree was not received during the month. General wilting of elms was first observed during the week of May 23.

FOREST INSECT INVESTIGATIONS

Winter kill complicates beetle scouting.--During a reconnaissance survey of the recently acquired Laramie Peak addition to the Medicine Bow National Forest in Wyoming to determine the need for insect control work, J. A. Beal, of the Fort Collins, Colo., laboratory, noted extensive damage to ponderosa pine by winter-killing. This damage resulted from rapidly changing temperatures in March. Changes as great as 50° F. were reported as occurring in 5 minutes' time. It is not known what percentage of the injured trees will recover, but it is believed that many of them will die. No insect attack has yet occurred on them, but they have been so weakened that even secondary insects may kill them.

A tent caterpillar damages pine in southern Colorado.--Mr. Beal found a tent caterpillar, tentatively determined as Euschausia argentata (Pack.), doing considerable damage to young ponderosa pine on the San Juan and San Isabel National Forests, in southern Colorado. The tops of infested trees were badly defoliated by May 1 and the larvae have continued to feed throughout the month. It appears that pupation occurs early in June. The larvae collected and placed in rearing were so heavily parasitized by a braconid, Meteorus acronyctae Mues., that very few reached maturity.

Residents of Wallace, Idaho, take steps to protect their shade trees.--At the request of a city official, W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, examined the shade trees of Wallace for evidence of insect injury. All weeping birch trees were found to be heavily infested with aphids, and a nicotine sulphate and miscible oil spray was recommended. It was also found that the elm trees were infested with the European elm scale (Gossyparia spuria Mod.).

Winter mortality obviates necessity for bark-beetle control.--J. C. Evenden, Coeur d'Alene, reports that, as a result of abnormally low temperatures, the mortality to overwintering broods of the mountain pine beetle in the white pine stands of Twelve Mile Creek, Cabinet National Forest, Mont., was so great during the past winter that contemplated control measures were considered inadvisable. An examination of the area early in May 1936 revealed nearly complete mortality of the overwintering bark-beetle broods in more than half of the infested trees, and in the remaining trees between 80 and 90 percent of the broods were parasitized. Under these circumstances more parasites than bark beetles would be destroyed during control operations.

Control of mountain pine beetle in lodgepole pine.--Mr. Evenden also reports that control measures conducted on the Minidoka National Forest, Idaho, against the mountain pine beetle in the lodgepole pine stands will be completed soon after June 1. Work on this forest is being performed by C. C. C. laborers, E. R. A. employees, and crews hired on regular appropriations. Control work on the Wyoming National Forest, Wyoming, against this beetle in lodgepole pine will be completed early in June. An examination of infested areas on the Cache National Forest, Utah, reveals such a light infestation following 3 years of control that no further treatment was considered necessary at this time.

Parasite liberation.--Messrs. Dowden and Berry liberated a colony of Tetrastichus turionum Htg. in a red-pine plantation at North Greenwich, Conn., where there is a moderate infestation of the European pine shoot moth. They also liberated colonies of Ephialtes examinator Fab. at Syosset, N. Y., and Newtown, Conn., for control of the same insect.

Frost injury aids in gypsy moth control.--W. L. Baker, of the New Haven laboratory, reports that extensive frost damage occurred on May 16, 21, and 22 at Freetown, Mass., where he has been taking climatological records in connection with the gypsy moth ecological project. The scarlet, black, white, and scrub oaks were severely injured. In one area, where a high percentage of scrub oak foliage suffered frost injury, it is probable that the gypsy moth infestation will be greatly reduced, owing to starvation of the larvae. This frost damage may be of real significance, particularly in scrub oak and sprout growth of white, black, and scarlet oaks, as such growth has seldom, if ever, been known to harbor heavy gypsy moth infestations. The reason for this phenomenon may lie in their susceptibility to frost injury. Although they may produce new foliage, the absence of the normal supply of foliage for several days when the gypsy moth is in early larval instars undoubtedly results in practically complete extermination of the insect where it is limited to such foliage for food.

Cankerworm control.--C. W. Collins reports that he and other members of the Morristown, N. J., laboratory have assisted the National Park Service of the United States Department of the Interior in tests they have been conducting at the Morristown National Historical Park for the control of cankerworms. In these tests arsenate of lead has been applied as dust and as a spray by means of an autogiro. This was done in plots of deciduous woodland growth where cankerworms have been abundant during the past few years.

Life cycle of elm borer.--C. H. Hoffmann, Morristown, reports that the elm borer (Saperda tridentata Oliv.) can complete its life cycle in 1 year under certain conditions. Oviposition was obtained in elm logs during June and July 1935. These logs were kept out of doors in cages. The first adult Saperda emerged on May 23, 1936, and others emerged during the month. Mr. Hoffman states, however, that the borer may require 2 and perhaps even 3 years to complete its life cycle under other conditions.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Work under gypsy moth projects.--Up to May 16, under the W. P. A. projects, the numbers of workers employed under the gypsy moth projects in the different States were as follows: Maine, 274; New Hampshire, 282; Vermont, 986; Massachusetts, 925; Rhode Island, 96; Connecticut, 796; New York, 241; New Jersey, 159; Pennsylvania, 1,295; total, 5,054. From July 1, 1935, to the time of gypsy moth egg hatching this spring, men from C. C. C. camps have creosoted over 4,000,000 egg clusters. This number would have been materially greater, but for the flood and the loss of many men for several weeks during the critical period this spring before egg hatching. In several locations in Vermont considerable injury to maple, ash, and butternut resulted from low temperatures (as low as 20° F.) the middle of May. At Dorset, Vt., on May 14 a gypsy moth crew found the mountain tops covered with snow. On many trees from 20 to 100 percent of the foliage was severely injured, the heaviest damage appearing on ash and butternut. In several instances small gypsy moth larvae that had not left the egg clusters were dead. Many tent caterpillars noted on hilltops and open country at Washington, Vt., were killed by the severe frost on May 17. A large number of newly hatched gypsy moth larvae at Charlestown, N. H., had been killed. Gypsy moth supervisors in Pennsylvania reported heavy frost damage to all varieties of oak, maple, ash, beech, hickory, and several other kinds of trees. This condition was noted in Lehigh, Penn Forest, and Kidder Townships, in Carbon County, and in Foster and Dennison Townships, in Luzerne County. The partly grown new foliage was dry and crisp as though fire had gone through it. Much frost injury was noted in Berkshire County, Mass.

The brown-tail moth situation.--On May 16, under the W. P. A. emergency project, the numbers employed on brown-tail moth work, were as follows: Maine, 314; New Hampshire, 33; Vermont, 6; Massachusetts, 33; total, 386. In the final check-up of webs found on the islands of Portland, Maine, 308,954 brown-tail moth webs were recorded as cut on the eight islands. In 1935 many people were forced to leave Peak Island because of the enormous number of caterpillars that congregated on the sides of the houses, hotels, and other buildings. Large oaks, elms, apples, and other trees were completely defoliated by the caterpillars early in summer, and people walking or sitting under the trees were annoyed by the caterpillars dropping onto them. The bodies of the brown-tail moth larvae are provided with barbed hairs that cause intense irritation to the human skin. These hairs are hollow and contain a poisonous substance which acts on the blood corpuscles, causing serious poisoning, severe irritation, and external swelling. Many people on the island suffered more or less from this condition during the summer of 1935 and children were kept indoors in order to protect them from possible poisoning. The infestation this year was much heavier than in 1935 and, had not these webs been cut and destroyed, the conditions on Peak Island would have been unbearable. On the other seven islands the infestations ranged from light to medium, depending principally on the amount of favorable food present. On Long Island, which is well populated during the summer, the infestation was heavy.

PLANT DISEASE CONTROL

Barberry eradication.--On June 6 there were 4,128 men employed in connection with the stem-rust control program. Of this number, 3,941 were security-wage earners and the remainder were under appointment with the Bureau as supervisors. Crews of laborers are now working in about 200 counties and it is expected that the present employment level will be maintained until the end of June. On June 11 E. C. Stakman, in charge of rust surveys for the Division, submitted the following report relating to the stem-rust situation in the Mississippi River Valley: "At present it appears that there cannot possibly be a repetition of last year's epidemic of stem rust on winter wheat. In Texas and Oklahoma most of the wheat is ripe or cut and the aggregate damage from rust is negligible, although in Texas some late fields and low spots in other fields were heavily rusted. In southeastern Kansas wheat development ranges from the flower stage to almost ripe and in most fields there is only a trace of rust, but in some late fields, particularly in soft red wheats, infection is fairly heavy. These fields may produce enough rust to serve as sources of infection for fields farther north. Throughout most of Missouri, northern Kansas, and southern Nebraska there are only traces of stem rust, with most of the wheat in the dough stage. Unless weather becomes extremely favorable for rust development, it does not seem likely there will be heavy general damage, although late fields could be damaged considerably. No rust has yet been found on winter wheat in Illinois, Indiana, Ohio, or Michigan. In the spring-wheat region, rust has been found in southeastern South Dakota but not elsewhere. Barberries are very heavily infected and from June 5 to 8 weather was favorable for rust spread. It is entirely too early to predict the probable development of rust in the spring-wheat region in general." Vern O. Taylor reports that security-wage earners are now employed in 25 counties in Wisconsin. Eradication activities will have been completed in at least 6 of these by the end of June. Mr. Taylor reports that barberry infestations have been encountered in all counties where laborers are now working. In several instances, where the original survey was completed prior to 1928, survey crews are destroying second-growth bushes which have developed from seed that was in the ground when the initial work was done.

White pine planting.--A large acreage of white pine is to be planted this season on the Manistee National Forest in Michigan. A technician from the Milwaukee blister rust control office spent the month of April on the forest with the six E. C. W. helpers in selecting and mapping 15,000 acres of relatively Ribes-free areas suitable for the planting and growing of white pine.

Blister rust notes.--J. E. Riley, State leader in blister rust control work in Connecticut, reports that the uredinial stage of blister rust was found on escaped red currants on May 26. This was the first report of uredinia received for this season from New England. Dr. Honey, of Wisconsin, also reports the finding of uredinia on May 26 on Ribes cynosbati in Portage County, Wis. He states that at that time infection was quite general in the county on the wild prickly gooseberry in the vicinity of infected pine, some bushes showing heavy infection. Many of the uredinia had broken and were disseminating their spores, indicating that uredinia had been developed and could be seen for some days prior to this date. Aecia on pine were known to have been disseminating spores for at least 3 weeks prior to this date and many were still disseminating spores.

Progress in blister rust control.--The field season for blister rust control got off to a good start this spring in the 27 cooperating States where work is now under way. Up to June 6, there were 1,735 persons employed on this work in the sugar-pine region of California and Oregon, 4,151 in the Northeastern region, 352 in the Southern Appalachian region, 1,540 in the North Central region, and 4,716 in the western white pine region of the Pacific Northwest. The latter figure includes a small number of men employed in the white pine forests of Colorado and Wyoming. This shows a total employment of 12,494 persons on this work, of which 6,043 are in the Eastern States and 6,451 in the Western States. Of this total, 11,912 are security-wage workers, the remainder being appointed personnel used as supervisors. Additional security-wage workers will be taken on during June until the quota scheduled for this project has been filled. At present over two-thirds of the quota has been obtained.

COTTON INSECT INVESTIGATIONS

Toxicity tests for boll weevil and leaf worms.--The cage toxicity tests for boll weevil and leaf worms conducted last season at Tallulah, La., have been reported on by G. L. Smith, J. C. Clark, and A. L. Scales. Screen cages 4 by 4 by 4 feet were placed over cotton plants on which the insects were introduced in the afternoon and then dusted the following morning. The tests were replicated at different times during the season and the natural mortality varied considerably. Untreated plants and plants dusted with calcium arsenate were used as checks with each series. Calcium arsenate mixed with sulphur 1 to 1, 1 to 3, and 1 to 9 (parts by weight) killed 60, 48, and 48 percent, respectively, of the weevils, as compared to 73 percent killed with calcium arsenate. Used against the leaf worms these mixtures were more effective and more uniform, each killing approximately 86 percent of the worms, as compared to 97 percent killed with calcium arsenate. Lime and kaolin mixed with calcium arsenate in the same proportions as the sulphur were less effective against both species than were the sulphur mixtures. Their toxicity also decreased more rapidly as the arsenical content was lowered. The toxicity of the six special calcium arsenates prepared under the direction of the Division of Insecticides ranged from 36 to 63 percent and all were less effective against the boll weevil than was the commercial calcium arsenate with 72-percent kill. The addition of 25 percent kaolin slightly improved the kill with some of the special calcium arsenates. For the leaf worm all the special calcium arsenates were more effective, ranging from 86 to 97 percent mortality, as compared to 93 percent for the commercial calcium arsenates. The kill of leaf worms with the special calcium arsenates was, with one exception, slightly decreased by adding 25 percent kaolin. Paris green killed 78 percent of the boll weevils, as compared to 67 percent killed with calcium arsenate. When mixed 1 to 3 and 1 to 9 with calcium arsenate the kill was not decreased, but was decreased when mixed in the same proportions with sulphur, and much more reduced with kaolin. For the leaf worms, paris green, calcium arsenate, and 1-to-3, or 1-to-9 mixtures of these two, were all about equally effective with more than 95-percent kill. The kill of leaf worms obtained with the mixtures of paris green, sulphur, and kaolin was lower than with the straight paris green but was not lowered as much as when used against the boll weevil. Derris root containing 4 percent rotenone killed 69 percent of the boll weevils, as compared to 60 percent with calcium arsenate, but when diluted with sulphur or kaolin to 2 percent, 1 percent, or 0.4 percent rotenone content, the kill was greatly reduced and was not comparable to calcium arsenate. The mortality of leaf worms with derris containing from 0.4 percent to 4.0 percent rotenone was much lower than with calcium arsenate in all tests. Phenothiazine, undiluted or diluted with sulphur or kaolin gave very poor results against both the weevil and leaf worm, killing from 8 to 53 percent. The results were better when this material was mixed with sulphur than when mixed with kaolin, and mixtures up to 1-to-9 with sulphur were almost as effective as the straight phenothiazine. Pyrethrum (0.5 percent total pyrethrins and "activator"), used alone or mixed with sulphur or kaolin, gave a very low kill of boll weevils. For the leaf worms, the kill with pyrethrum containing 0.5 percent pyrethrins was almost equal to the calcium arsenate, but pyrethrum was not so effective when mixed with sulphur or kaolin, although the sulphur mixtures were better than kaolin mixtures.

Boll weevil emergence and abundance.--Weevils were removed from the hibernation cages beginning on May 11 this year. This date was selected because cotton was up to a stand in the fields and the weevils were able to find terminal buds for feeding. At Florence, S. C., F. F. Bondy recorded only 2 weevils emerging from hibernation cages in May, as compared to 152 weevils in 1935, 9 in 1934, and 2,300 in 1933 from comparable cages. The winter of 1935-36 was exceptionally cold, with a minimum of 2° F. on February 1. The month of May was very dry, having only 0.17 inch of rainfall. The first weevil was found in the field on May 11. During the last week in May, 13 weevils per acre were found in the fields examined. During the same period, 115 weevils per acre were found in 1935, and 14 per acre in 1934.

The stand of cotton is generally very poor and in some fields seed has not germinated because of lack of moisture. This condition has tended to concentrate the weevils in the better fields, where examinations were made. The present indications are that it will take a rainy season to cause much early weevil damage. At State College and Hattiesburg, Miss., H. C. Young and L. L. Williams also report that weevils are less abundant than last year. In Oktibbeha County weevils were found on only 5 of the 28 farms examined during the week ending June 6. An average of 1.6 weevils per acre were found, as compared to 29 weevils per acre in 1935. In Forest County 10 fields were examined, yielding an average of 17 weevils per acre, as compared to 94 per acre in 1935 and 212 per acre in 1934. At Tallulah, La., R. C. Gaines and associates reported that a total of 52 weevils had emerged from cages to June 6, as compared to 36 in 1935, and 2,395 in 1934 from comparable cages. Weevils were also scarce in the fields, only 9 per acre being found, as compared to 138 per acre in 1935 and 309 per acre in 1934. Two weevils were caught on the flight screens during the week ending June 6, as compared to 23 in 1935 and 49 in 1934. At College Station, Tex., R. W. Moreland reports that 791 weevils had emerged from the hibernation cages to June 6, in comparison with 68 in 1935 and 1,033 in 1934 from comparable cages. There was a very heavy emergence during the last week of May with 332 weevils coming out of hibernation. In field examinations 20 weevils per acre were found in the river bottom fields and 795 per acre in the upland fields. Cotton is several weeks later than in 1935, when an average of 28 percent of the squares were found infested on upland cotton and 1 percent on bottom land during the first week of June. K. P. Ewing and associates report an average of 6 weevils per acre on cotton in the open prairie section of Calhoun County, Tex. In the adjoining counties, no weevils were found in the prairie section, and 122 per acre in the river-bottom fields of Victoria County and 375 per acre in the river-bottom lands of Jackson County. At Eufaula, Okla., C. F. Stiles reports that no weevils had emerged from the hibernation cages up to June 2. Last year 20 weevils had emerged and in 1934, from comparable cages 185 weevils had emerged by this date. It is still very dry, which may be one reason why weevils are not emerging.

Hemipterous insects of cotton in 1935.--Reports on the damage caused and results of tests conducted at Buckeye, Ariz., last season with insecticides for controlling hemipterous insects of cotton have been received from T. P. Cassidy and T. C. Barber. Included in this group attacking cotton are Euschistus impictiventris Stahl, Chlorochroa sayi Stahl, C. ligata Say, Thyanta custator Fab., Dysdercus mimulus Hussey, Lygus hesperus Knight, Psallus seriatus Reut., Parthenicus sp., and several other species. All of these insects have other cultivated and wild hosts from which they migrate to cotton when these plants become unsuitable for food. More than normal winter rainfall caused a heavy spring growth of desert vegetation favorable for breeding. With the drying up of these plants, the harvest of the winter grain crops, and the withholding of irrigation water from alfalfa, there was a general concentration on the cotton. Apparently the pentatomids are not able to breed on cotton until after fruiting begins, and some of the mirids have difficulty in maintaining themselves on cotton. Of the five species isolated in field cages to study the extent and nature of their damage, Euschistus impictiventris caused the most serious damage. The number of bolls set was greatly reduced and those present were so badly punctured that the lint was almost completely destroyed. Lygus hesperus caused the shedding of many squares and also caused growth abnormality of the plants. The destruction of the small leaf buds and minute squares by Lygus produces plants with many vegetative branches, short, thick internodes, and distorted and swollen nodes. C. sayi, T. custator, and D. mimulus all caused a serious reduction in the number of bolls produced and staining and discoloration of the lint in the bolls produced. The field damage caused by the different species does not necessarily rank them in this order because of the variation in their relative abundance throughout the season. It is also difficult to differentiate between the damage caused by the different species within the two groups of insects. The damage caused by the square-feeding mirids is partly compensated for by the production of other squares, whereas the damage by the pentatomids is largely to bolls, which are not replaced. A survey was conducted near the end of the season to estimate the damage in the important cotton sections of Arizona. Samples of bolls from representative fields were examined for proliferation and punctures; therefore the results did not include the damage to the squares. Considerable variation was found in different districts, averages ranging from 43 percent of the bolls punctured in Yuma County to 7.7 percent in Pima County. In Maricopa, the most important cotton county, 41 percent of the bolls were punctured and the average for the entire State was 27 percent of the short-staple varieties, as compared to 23.4 percent in 1934. Bolls of short-staple varieties were more damaged than those of long-staple varieties. Considerable variation in damage among the short-staple varieties was noted in a variety test at the Bureau of Plant Industry's laboratory at Sacaton.

Control of hemiptera on cotton.--Eight insecticides or combinations of insecticides were tested in 1-acre field plats. Dusting was started on July 30 and continued at approximately 5-day intervals until nine applications had been made. A frost on October 30 killed the plants about 3 weeks earlier than usual and somewhat reduced the yields, as there were still many green bolls on the plants. The results were as follows:

Materials tested	Increase per acre in yield of seed cotton over check	Percentage of increase
	Pounds	
Lead arsenate	523	28.57
Sodium fluosilicate	-151	-8.27
Derris (0.6 percent rotenone)	131	8.26
Derris and sulphur (0.3 percent rotenone)	151	9.09
Paris green (1 part); sulphur (14 parts)	247	14.75
Sulphur	206	12.29
Pyrethrum (0.58 percent pyrethrins and "activator")	137	9.35
Pyrethrum (1 part) and sulphur (1 part)	41	2.80

Records were also made of forms, insect population, and punctured bolls in the plats during the season and these, in general, corresponded with the increases in yield. The gain from the lead arsenate plat was slightly less than in 1934, when it was also larger than from any other insecticide tested. Cage toxicity tests with *E. impictiventris*, *C. sayi*, *T. custator*, *D. mimulus*, and *L. hesperus* ranked the insecticides differently. Considering these four species collectively, the average mortality in the cage tests was: Derris, 62.8 percent; cube, 45.2 percent; derris and sulphur, 40.4 percent; sodium fluosilicate, 37.2 percent; phenothiazine, 28.2 percent; lead arsenate, 23.2 percent; and sulphur, 3.2 percent.

Pink bollworm in Puerto Rico.--L. C. Fife reports that, owing to delays in planting on account of drought conditions, cotton fields of all ages from young seedlings to those with open bolls are to be found among the 2,500 to 3,000 acres on the northern coast of Puerto Rico. The pink bollworm infestation is already rather high this early in the season and with the long season before harvest an unusually heavy infestation is expected. The only other plants in which the pink bollworm has been found are Maga (*Montezuma speciosissima*) and Clamor (*Thespesia populnea*) and only when these are growing within 2 to 3 miles of infested cotton. Of the larvae in infested bolls collected during January and left on the soil surface 65 percent remained in an inactive state for 41 days, 26 percent for 82 days, and 4 percent for 125 days, showing that the pink bollworms in open bolls form a long cycle or resting state and are able to survive in the absence of host material for more than 4 months. Live larvae were found in cocoons formed in the soil after 78 days, but none after 120 days. Fire ants, however, had destroyed most of the larvae in these cages.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Trap-plot cotton in the Big Bend.--Because of cold weather during April, the trap-plot cotton in the Big Bend area of Texas did not get a very good start. During May, however, conditions were more favorable, and the cotton made fairly satisfactory growth. The unfavorable weather also affected the field cotton and although the plot cotton is not as far advanced over the field cotton as we would like, in most cases there is still probably enough difference to produce the desired results. By the end of May the plot cotton was beginning to produce a few blooms, and during the first few days of June some of these were found to be infested. This year considerable stub cotton came up in the Big Bend area and it was considered advisable to destroy it. Very little such cotton was located in the upper end of the area, but in the Presidio district some 24,000 plants were grubbed out, as were 2,000 plants at Castolon, in Brewster County. This stub cotton had already begun putting on squares and while it was being destroyed some of the larger squares were examined and found to be infested. The destruction of this cotton before any worms reached the adult stage will undoubtedly aid in preventing the building up of infestation early in the season.

Wild cotton eradication.--The eradication of wild cotton in southern Florida has continued to make very good progress. Work was completed in a number of sections before the end of the month. In several sections along the west coast a second recleaning for this season has been done, and this should prevent any plants reaching the fruiting stage before work is resumed in the fall. Work will still be carried on in a few places during the first part of the coming month. During May a first clean-up was made on 836 acres, from which 6,842 mature and 6,193 seedling plants were destroyed. A recleaning was made on 8,657 acres, and 2,217 mature, 192,513 seedling, and 2,517 sprout plants were destroyed. Over 1,800 of the mature plants were destroyed on Cape Sable. Work is being carried on with W. P. A. funds and mature plants will be found in areas previously cleaned, as the larger crews now being used are able to cover the territory more thoroughly. The small number of mature plants found in areas recleaned several times indicates that considerable progress is being made toward eradicating the wild cotton. Bolls were collected throughout the month as the wild cotton was destroyed, and a number of pink bollworm specimens were found. Infestations were found at Sound Point off Key Largo, where infested bolls were collected last month, on Lignum Vitae Key, and on lower Matecumbe Key, all in Monroe County.

Thurberia plant eradication.--The eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona has gone forward satisfactorily without loss of time. A considerable number of plants were located and destroyed during the first half of the month in sections close to those in which a large number of plants were found the latter part of April. The latter half of May the crews worked along the southern edge of the mountains northeast of Tucson. As the area was not so rough as some sections previously worked and as fewer plants were encountered, the men were able to cover larger acreages each day. During the month, 11,960 acres were covered and 106,873 plants were destroyed. Many of the colonies of plants were infested with the Thurberia weevil, and it is to remove this menace to commercial cotton that the Thurberia plants are being destroyed. This work also is being carried on with W. P. A. funds.

Laboratory inspection.--The inspection of material collected from the 1935 cotton crop has gone forward as usual. These inspections are being carried on at San Antonio and a number of field stations. Now that the ginning season has been completed, there is less regulatory work to do; consequently the men at the field stations are able to devote more time to inspection. A considerable amount of material collected within and outside regulated areas was inspected during the month with negative results, other than the findings in the wild cotton bolls previously mentioned.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Effectiveness of sprays containing rotenone or pyrethrum against false chinch bug on sugar beet.--E. W. Davis, of the St. George, Utah, laboratory, reports that in recent insecticide tests directed against *Nysius ericae* Schill. as a pest of sugar beets grown for seed, promising results were obtained with sprays containing a low percentage of rotenone with a commercially prepared diphenyl butyl sodium sulphonate as a spreader and wetting agent. Slightly inferior results were obtained with sprays containing pyrethrum. Sprays containing nicotine sulphate had an immediately beneficial effect, but the plants treated with this material became reinfested within 4 or 5 days. Results of these preliminary tests indicate that under conditions existing in Utah, sprays containing rotenone or pyrethrum may be effective in controlling the false chinch bug as a pest of sugar beets grown for seed.

Insecticides containing rotenone vary in toxicity to cucumber beetle species.--As a result of preliminary cage and field tests performed by K. B. McKinney, of the Phoenix, Ariz., laboratory, it appears that rotenone-containing insecticides are more toxic to the striped cucumber beetle (*Diabrotica vittata* Fab.) and the banded cucumber beetle (*D. balteata* Lec.) than to the spotted cucumber beetle (*D. duodecimpunctata* Fab.). These results were obtained during the course of experiments wherein cantaloups, cucumbers, and watermelons infested by the three species of beetles were treated with a dust mixture of derris and cube containing 1 percent rotenone, with talc as a diluent. It was shown that, under conditions existing in the Salt River Valley of Arizona, talc alone had some repellent effect on the three species of beetles involved. In general, the application of this dust mixture kept small watermelon vines growing in the field free from beetles for at least 4 days.

Derris root sprays effective against bean leaf beetle.--L. W. Brannon, of the Norfolk, Va., laboratory, reports that in preliminary tests, derris sprays containing 0.015 percent rotenone were shown to be effective against *Cerotoma trifurcata* Forst., which has been abnormally abundant in the Norfolk section during May. The treatment applied to the infested snap beans was the same as that recommended for the control of the Mexican bean beetle. Before treatment of these snap beans, the foliage injury caused by the bean leaf beetle was estimated at from 60 to 75 percent. Eleven days after treatment the foliage injury on the treated plots was estimated at from 5 to 15 percent, whereas on the untreated plots it ranged from 35 to 40 percent.

Small spring brood of beet leafhoppers in southern Idaho.--According to a report from J. R. Douglass, of the Twin Falls, Idaho, laboratory, the movement of the beet leafhopper from the desert areas to the cultivated fields of southern Idaho began about May 25 and reached its peak on or about June 1. The spring brood of leafhoppers in this region is relatively small this season, as a result of the low populations of overwintering leafhoppers and a scarcity of favorable host plants in the desert areas upon which to reproduce early in the spring. Weather conditions in May were only slightly above normal; consequently the magnitude of the spring brood and the time of movement into the cultivated areas were in accordance with early season indications.

Lima bean pod borer adults attracted to monochromatic blue light.--Reporting on phototropic studies made in cooperation with the University of California at Berkeley, Cecil Rodney, of the Ventura, Calif., laboratory, says that in general the lima bean pod borer adults did not exhibit any differences in the phototropic reaction between the sexes or the ages of the adults, but that all of the adults were attracted in a similar manner to a monochromatic blue light in preference to the darker blue lights used in the tests and to various shades of yellow, green, red, and violet.

Effect of direct sunlight on toxicity of cube dust.--F. S. Chamberlin, of the Quincy, Fla., laboratory, reports that recent laboratory and field experiments designed to determine the loss in toxicity of cube dust as a result of exposure to direct sunlight have shown that the toxic properties of a cube dust mixture with denicotinized tobacco dust as a diluent have decreased rapidly when this dust mixture was subjected to direct sunlight, and measured by its toxicity to the tobacco flea beetle. These experiments also disclosed that the cube dust mixture containing 1.5 percent rotenone maintained its toxicity much longer than did a dust mixture containing 0.5 percent rotenone. A cube dust mixture containing 1 percent of rotenone killed 74 percent of the tobacco flea beetles after the dust mixture had been exposed to direct sunlight for 24 hours, which was equivalent to approximately 48 hours' exposure under field conditions. In performing these experiments it was not possible to make proper allowance for two important influences which ordinarily occur under normal shade-grown tobacco conditions, namely, the wetting effect of heavy dews and the dense shade which prevails within a crop of maturing shade-grown tobacco. Consequently, it is probable that under actual field conditions cube dust mixtures will retain their insecticidal efficiency against the tobacco flea beetle for a longer period than was indicated by these experiments.

Quantity of tobacco consumed by each cigarette beetle.--In connection with biological studies on the cigarette beetle, E. M. Livingstone, of the Richmond, Va., laboratory, reports that detailed laboratory experiments have shown that it requires an average of approximately 0.0151 gram of Turkish tobacco to feed each cigarette beetle throughout its life period and that the weight of the frass from each beetle averaged approximately 0.0118 gram. These experiments were conducted under temperature and humidity conditions which, previous experiments had shown, provided optimum conditions for the cigarette beetle.

INSECTS AFFECTING MAN AND ANIMALS

Percentage hatching of eggs of certain species of mosquitoes of Pacific Northwest.--H. H. Stage, of the Portland, Oreg., laboratory, working on the life history and habits of the more important species of mosquitoes of the Northwest, reports as follows: "In order to obtain a check of the percentage of eggs of Aedes vexans Meig. and A. aldrichii Dyar and Knab hatching with the normal flood of the Columbia and Willamette Rivers, a series of five samples were flooded each week under outdoor conditions, beginning on April 13. In the five samples flooded on that date, 6.2 percent of the A. vexans and 8 percent of the A. aldrichii hatched. In the series of samples flooded weekly from that time to the present the hatch has been completed for both species. Prior to April 13, samples produced no larvae, even though they were flooded in the laboratory. Our observations demonstrated that the eggs began to hatch in nature between April 2 and 13 and by April 21 all had developed to the point of hatching. The first larvae of the season were found in nature on April 21, when the river height was 9.7 feet. It seems probable, therefore, that nearly all of the eggs should have been hatched, as the crest of 19.4 feet was not reached until May 18."

Spread of primary screw worm fly.--Studies undertaken by D. C. Parman, C. C. Deonier, and W. L. Barrett, of the Uvalde, Tex., laboratory, show that Cochliomyia americana Cushing and Patton overwintered along the edges of the Edwards Plateau escarpment and from points along this line they have, up to June 9, spread as far north as Parker County, Tex.

Wild-animal hosts of C. americana.--A. W. Lindquist, of the Uvalde laboratory, working on wild animal hosts of the primary screw worm fly, has found that jack rabbits, cottontails, opossums, and deer were quite frequently infested with larvae of this species during May. The occurrence of screw worms in opossums is a new host record for this species, and it is indicated that this class of animals is very susceptible to screw worm attack. The males frequently fight with consequent injuries, and the females, especially when carrying the young in the pouch, offer attractive places for oviposition by C. americana. The infestations occurring in cottontail rabbits usually result from holes in the skin caused by emergence of bot flies.

Phenothiazine as a screw worm larvicide.--Preliminary experiments carried on by Roy Melvin, E. R. McGovran, L. C. Ellisor, and Raymond Bushland, at the Dallas, Tex., and Valdosta, Ga., laboratories, for the purpose of developing more effective larvicides against screw worms, indicate that phenothiazine may be of value for this purpose. This material, when applied to an infested wound, gave a very high kill and, in addition, young larvae hatched from eggs deposited after the application were prevented from becoming established.

Outdoor tests of the repellent action of various insecticides against Mansonia perturbans Walk.--Tests were made by W. V. King, G. H. Bradley, and T. E. McNeel, at the Orlando, Fla., laboratory, to determine the effectiveness of various insecticides when applied out of doors in keeping down the abundance of mosquitoes, M. perturbans, in a given area. The materials tested include pyrethrum extract emulsion, kerosene emulsion, pyrethrum dust and sulphur, pine-tar-oil emulsion, and nicotine dust. The materials were applied shortly before the dusk flight of the mosquitoes, and the effectiveness of the various insecticides was checked by determining the relative abundance of the mosquitoes caught in electric-light mosquito traps which were operated all night in each of the treated and untreated areas. The percentage reduction ranged from 0 for pine-oil emulsion and pyrethrum dust with sulphur to 90.8 percent for pyrethrum-extract emulsion.

FOREIGN PLANT QUARANTINES

Unusual apple infection from Japan.--An apple from Japan intercepted on April 22 at Philadelphia bore a number of unusual circular, light-colored spots with rather sharply delimited margins and a tiny dark dot in the center. Isolations from these spots by specialists in the Bureau of Plant Industry gave pure cultures in all instances of Cephalosporium parmelii var. purpurascens Buchanan. This fungus, described by R. E. Buchanan in 1911, was reported to be present in humus-rich soil in Iowa. This seems to be the first report of this fungus affecting apple although at least one other species of Cephalosporium is capable of producing a slow decay on apples and pears. On May 18 an apple from Japan bearing similar spots was intercepted at Portland, Oreg. It seems possible that a Japanese strain of the fungus has become a regular parasite of apple.

Tuckahoe potato reported in China.--A note in the January News Letter, page 22, stated that so far as known the Tuckahoe potato (Poria cocos (Schw.) Wolf) had not been reported from China. We find that two Chinese scientists have published an article in one of their journals indicating that the fungus is not only found there but is grown as a crop. In some places the sclerotia are grown by burying small pine poles in hill slopes leaving one end exposed for inoculation artificially with small flakes of sclerotium or by natural means. In other localities the fungus is twice subcultured on completely buried poles before the main crop is grown in the manner described above. Over 1,000 tons of the sclerotia are exported annually. It is imported at San Francisco in quantity. The Chinese call the sclerotia "fuhling" and use them medicinally. The Japanese "bukuxyo" may be the same fungus, according to the Chinese scientists.

Dirigible Hindenburg carried plant diseases.--Inspectors from Philadelphia made the following plant disease interceptions May 9 when they inspected the Hindenburg following its first arrival: Anguillulina dipsaci (Kuhn) Gerv. and v. Ben. in potato; Aspergillus sp. on rose stems; Botrytis cinerea Pers. on cabbage and tulips; Cladosporium sp. on carnations and roses; Diplocarpon rosae Wolf on rose leaves; Fusarium sp. on rose stems; Macrosporium sp. on leek leaves; Penicillium sp. on asparagus, cabbage, leeks, onions, roses, and tulips; Phomopsis citri Fawc. on lemons (from Italy); Rhizopus nigricans Ehr. on cabbage; Spondylocladium atrovirens C. O. Harz on potatoes.

Plant diseases at Chico.--Knowledge of plant diseases found on all plants growing in and near plant quarantine stations should be available to inspectors in order that they may properly evaluate their findings. In order to obtain such knowledge collections must be made over a period of years. An effort is being made to do this at the Chico, Calif., station. An analysis of the plant disease collections made at this station in the latter part of October 1935, shows 4 collections belonging to genera not reported to occur on the hosts concerned, 3 collections unlike the species reported on the host, another reported as "probably" a new species, and 10 collections determined to genus only and hence of doubtful status. In view of the large number of unusual hosts in the Chico collections and the range of native hosts and little-known diseases, this may seem to be a small number of new records; however, there are enough to justify the conclusion that intensive collecting should be continued.

More shamrocks at Baltimore.--An unusual number of mail shipments of shamrock entered at Baltimore this year, adding eight insects to their list for the host. These insects were Achorutes sp., Ceutorhynchus sp., Dorytomus sp., Leimacis ? dimidiata (Curt.), Megophthalmus scanius Fall., Mycetoporus sp., Tachyporus sp., and Tipula sp. The insects were alive when found. Thrips, mites, Alternaria sp., Bacteriaceae, and Fusarium sp. were found on the shamrock also.

Cottonseed on top of railway car returning from Mexico.--In connection with the inspection of freight cars returning from Mexico at Mexican border ports, it has been the opinion for a number of years that there was little likelihood of cottonseed being on the top of box cars; hence the inspection of these cars has been confined chiefly to the interior of the cars. On January 15, 1936, a car inspected in the railway yards at Juarez, Chihuahua, Mexico, resulted in the finding of approximately 10 pounds of cottonseed on the top of the car. The seed appeared to be old and there was evidence of previous insect infestation. No living insects were found, but close examination revealed the fragments of four dead larvae which were identified as the pink bollworm.

Cottonseed in alligator mouth.--A dozen cotton seeds were found in a wad of cotton in the mouth of a small stuffed alligator in the baggage of a passenger from Puerto Rico landing at New York, March 16.

"Bug Convention" in packing.--Over 90 "delegates" belonging to more than 30 genera or species were found to be using the packing around a single grape cutting as a "convention hall" when some baggage from Germany was inspected at New York on January 10. The packing consisted of ¼ pound of sphagnum moss mixed with a very small amount of forest litter.

DOMESTIC PLANT QUARANTINES

Transit-inspection activities.--During March and April, 445,394 shipments of nursery stock and other restricted articles were inspected at 22 stations, and 629 violations of the regulations of domestic plant quarantines were intercepted. Inspection records show that more shipments were inspected and more interceptions made during these months than at any similar period during recent years. The movement of nursery stock through St. Paul and Minneapolis was also heavier this spring than for several years past, and the retention of a full-time transit inspector in the Twin Cities has been fully justified. Of special interest was the interception at Omaha and Council Bluffs of 99 violations of the Japanese beetle quarantine in March, April, and May, as compared with 18 in the same period last year. This increase is due to the expansion of activities at this point.

Wisconsin establishes blister rust control areas.--The eradication of all European black currant plants from the State of Wisconsin, with no compensation allowed to owners, was ordered by the Wisconsin department of agriculture and markets in a notice dated May 5, 1936, declaring these plants to be carriers of the white pine blister rust.

Citrus canker inspection in Texas.--Recent inspections for citrus canker in Texas covered the counties of Matagorda, Jackson, Calhoun, and Victoria, an area in which canker was known to exist in former years. Other crews continued to reinspect properties in the Houston area. The decrease in the number of infections found in 1936, as compared with those in 1935, indicates progress in eradication.

Aerial survey of ground flora proves practicable.--An analysis of the recent experience in the use of an autogiro, loaned by the leader of the Dutch elm disease project, for a survey of citrus growth in the Louisiana marsh area has confirmed the belief that such a method of survey of this inaccessible area is entirely practicable and economical. It was found that the giro could be lowered to within 25 feet of the plants, slowed to 25 miles an hour, and circled in a small radius, making it easy to identify the plants without the use of binoculars. The entire Gulf coast from New Orleans to Orange, Tex., an area approximately 200 miles long and from 30 to 50 miles wide, was covered, representing an examination of approximately 500 square miles a day. The region is largely marshland, interspersed with many hundreds of timbered moats and other small dry-land areas, some of which have been used as camp sites by many generations of fishermen and trappers. It has been recognized that citrus, subject to canker infection, existed on some of these sites. The survey disclosed approximately 600 such trees on 24 locations. These places will be reached by mud boats poled over routes known only to trappers and fishermen and the trees will be inspected.

Phony peach disease inspection.--Under the expanded inspection program made possible by the Emergency Relief allotment, 123 inspectors are now engaged in inspecting peach plantings and peach nursery environs in 11 infected States. State inspectors in most of the States serve as leaders, devoting their entire time to the work, and in some instances practically the entire force of State nursery inspectors has been temporarily assigned to this work. To the close of May, 81 counties have been worked, representing inspection of over 6,000,000 trees on 16,847 properties. Over 17,000 infected trees have been located to date. In view of the more complete coverage, it is difficult at present to determine the relative prevalence of the disease as compared with previous years. Excellent cooperation has been received from State officials and from growers in obtaining the prompt removal of diseased trees. Eradication crews under the W. P. A. project have removed over 35,000,000 abandoned, escaped, and infected trees during the life of the project.

Peach mosaic disease situation.--The relief-work project relating to the inspection and eradication of the peach mosaic disease is continued in Mesa and Delta Counties, Colo., 9,295 infected trees in Mesa County and 12,320 abandoned peach trees in the area having been destroyed since the project was begun last August. An intensive tree-by-tree inspection of the diseased area, just completed, disclosed an 80-percent reduction in infection over that of a year ago. In addition to the mosaic infection in Mesa County, Colo., this disease is known to exist in widely scattered areas in Texas and in local areas in Utah and California. The cooperative survey now being conducted in Iowa, Nebraska, Kansas, and New Mexico has thus far resulted in finding no infections in these States.

BEE CULTURE

Honeyflow disappointing.--The early honeyflow in the vicinity of the National Agricultural Research Center, Beltsville, Md., has been disappointing this spring. Strong colonies stored some surplus, but weak colonies and those of average strength have thus far gathered only about enough for their daily needs.

Notes on foulbrood.--Additional experiments on the resistance of spores of *Bacillus larvae* White to heat have shown that they possess a remarkable degree of resistance to boiling in water. In recent tests growth was obtained in most of the cultures prepared with spores that had been boiled for 4 hours. Germination was delayed longer than with unheated spores, but the growth was fairly luxuriant. Negotiations are in progress with the Agricultural Experiment Stations of Wyoming, Iowa, Wisconsin, and Texas for cooperative investigations of the resistance of honeybees to American foulbrood. A. P. Sturtevant, in charge of the Intermountain Bee Culture Field Laboratory, Laramie, Wyo., is planning the details of this new project.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A curculionid infesting the fruit of banana.--Three distinct lots of material intercepted by the Division of Foreign Plant Quarantines at Brownsville, Tex., and submitted for identification contained coleopterous larvae which have been identified by A. G. Boving as *Metamasius* sp. This form is of more than usual interest, as *M. sericeus* Oliv. and its variety *carbonarius* Chev., commonly found in banana debris, are known to bore in roots and stems but have not been found in the fruit. After a careful study of the available larval material of *Metamasius*, Mr. Boving has concluded that the larvae from banana fruit are distinct from *M. sericeus*, but that they cannot be distinguished from larvae of *M. ritchiei* Marsh. from Jamaica, which were found infesting pineapple. The species in this group are exceedingly close, however, and it is not presumed that the specimens from banana are in reality *M. ritchiei*.

Ceutorhynchus assimilis Paykull abundant in Washington.--This European weevil, recently recognized from North America, is reported as a serious pest of seeds of cabbage and turnips at Mt. Vernon, Wash., by A. J. Hason, who submitted more than two hundred adult specimens for determination. These were identified by L. L. Buchanan.

Larva of *Phyllophaga vandinei* received.--Among some Puerto Rican material received for identification from H. K. Plank were adults, larval and pupal skins, and one larva of a species of *Phyllophaga* which has been identified by E. A. Chapin and A. G. Boving as *P. vandinei*. This is very interesting and useful material, as it apparently represents the first association of the larva and adult of this species.

On the identity of Rhyacionia zozana (Kearf.).--There have recently been received, for identification, from W. Harry Lange, Jr., of the University of California, two moths (male and female) which Carl Heinrich tentatively placed in the genus Petrova. However, on the occasion of a visit to the American Museum in New York, Mr. Heinrich found these specimens to be Rhyacionia zozana Kearf., which has hitherto been known only from the single female type in the collection of that institution. R. montana Busck, known only from the male type, proves to be only a race or variety of R. zozana, in Mr. Heinrich's opinion.

First U. S. record for the calliceratid genus Plastomicrops Kieff.--Among certain minute Hymenoptera taken at Asheville, N. C., apparently in the course of soil sifting, and submitted for identification by Arthur P. Jacot, were three minute specimens which have been determined by C. F. W. Muesebeck as Plastomicrops n. sp. Plastomicrops is a rather remarkable genus of Serphoidea belonging to the family Calliceratidae and known only from the species P. acuticornis Kieff., which was described from Italy and has not been known to occur elsewhere. The habits of the group are unknown. The species will probably be found to be parasitic in some small soil-living insect.

Another U. S. record for a European parasite of grain-stem sawflies.--In the March number of the News Letter (vol. 3, no. 5, p. 25, May 1, 1936) there was reported the rearing of two specimens of the European braconid parasite Microbracon terebella (Wesm.) from Trachelus tabidus (Fab.) at Adamsville, Pa. Since then three additional specimens of the same parasite were submitted for identification by E. J. Udine, of the Carlisle, Pa., laboratory of the Division of Cereal and Forage Insects. These specimens were reared from Cephus pygmaeus L., at Shelby, Orleans County, N. Y. These records indicate the definite establishment of this grain-stem sawfly parasite in the United States.

Pine-infesting coccid discovered in the Southwest.--The trip to Arizona made by Harold Morrison in April and May for the purpose of examining infestations of the coccid Matsucoccus associated with twig blight on ponderosa pine, resulted also in the discovery of a very interesting related, although generically distinct, form on Pinus monophylla and P. edulis.

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DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE NEWS LETTER

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JUNE 1936

Vol. III, No. 8 (Not for publication) August 1, 1936

FRUIT INSECT INVESTIGATIONS

Correction.--In the Bureau News Letter for May 1936 (vol. III, no. 7) paragraph 1, line 12, on page 2, "per 100 linear feet" should read "per linear foot."

Biological control of citrus blackfly in Cuba.--Following a trip to Cuba early in May, D. L. Van Dine, Washington, D. C., reports on the control of the blackfly on citrus by an introduced parasite. In cooperation with the Plant Quarantine Service and the Department of Agriculture, Commerce, and Labor of Cuba, the parasite Eretmocerus serius Silv. of the blackfly (Aleurocanthus woglumi Ashby) was introduced into Cuba in the spring of 1930 from Malaya by C. P. Clausen and released through facilities supplied at the Cuban Agricultural Experiment Station at Santiago de las Vegas, Province of Havana. In the two localities visited the groves were heavily infested by the blackfly before its parasite was introduced. In one section of the first grove inspected, only occasional leaves could be found with small colonies of the blackfly on them. In another section of the same grove the blackfly was not so difficult to find but the infestation was of no consequence. No evidence of the parasite was found, but S. C. Bruner stated that this was on account of the blackfly colonies being in an early stage of development and that if the infested leaves were placed in a breeding jar the parasite would surely develop from them. On one side of the second grove visited near Santiago de las Vegas, the outer trees had quite a large infestation of blackfly on the older leaves in an advanced stage of development. Mr. Bruner said that the host would build up this way in what he termed a "wave" that would shortly be completely suppressed by the parasite. Here the parasite was found emerging from the host. Mr. Bruner stated that they have not failed to breed the parasite from any blackfly material collected by them or received by the experiment station from growers since 1931, the year following the liberation of the parasite. The second locality visited was the Ceballos district in the Province of Camaguey. It was found that the blackfly has ceased to be a problem in that section also since 1931. This is in great contrast to the conditions familiar to the writer prior to the introduction of the parasite, when blackfly infestation rendered all the groves conspicuous because of their sooty appearance. Several of the orange growers in Ceballos said that if the expenses of blackfly control had continued during the recent years of low prices they could not have financed their places. A grower who has 98 acres of oranges in bearing under irrigation used 1,000 gallons of an oil spray every year. Since 1931 it has not been necessary for him to use a single barrel of this spray material, a saving of $500 on material alone each year for 5 years. The entire citrus colony at Ceballos purchased 300 barrels of this spray material for blackfly control. This is an indicated saving of $37,500 in spray for the 5-year period. When the labor cost of spray applications is added, and the low prices which prevailed during the period are considered, it is seen that the part played by the parasite in the maintenance of orange production in that section is an important one, and that for the island as a whole, the role of the parasite is very important.

Dried fruit beetle overwintering in soil and surface debris of fig plantings.--By use of the Shirck soil washer(described in ET-71) Dwight F. Barnes and Charles K. Fisher, of the Fresno, Calif., laboratory, made a survey of soil in fig plantings during the winter and spring. For the first time extensive data were made available, showing that large numbers of the dried fruit beetle and associated nitidulids may pass the winter in soil under fig trees. Samples taken in January and February in three locations averaged 1,250, 1,858, and 1,707 larvae, pupae, and adults per tree. Early in March samples averaged 490, 325, and 714 stages per tree. Late in March, after spring plowing, none were found in the samples. Examinations of undisturbed soil sampled late in March and early in April indicated that emergence was completed between March 28 and April 6. The figures given include all insects identified as nitidulids, the greater portion of which were probably Carpophilus hemipterus L. Surface debris, consisting largely of decaying leaves, was removed from unit areas under fig trees and the nitidulis population recorded by means of a chloropicrin separator (see ET-21). Smaller populations were found in debris than in soil, but as many as 950 adults per tree were indicated. Larvae were not obtained in samples taken after rains in February and adults had left the debris by the middle of March. Pupae were not found in these samples.

Winter mortality of the raisin moth.--Perez Simmons, Fresno, reports that a study of winter mortality of full-grown larvae of the raisin moth (Ephestia figulilella Greg.), hibernating in the soil and under timbers, was made by H. C. Donohoe from December 19, 1935, to March 26, 1936. Larvae webbed beneath timbers lying on the ground in a dry location showed the lowest mortality (30 percent) by March 26. In soil that occasionally became moist 75 percent of the larvae had died by the same date, whereas those in soil that stayed wet all winter showed a mortality of about 96 percent at the end of the observation period.

Codling moth stages a swift comeback.--Although the 1935 season was characterized by an abnormally low level of codling moth population at most points in the West Central States, conditions appear to have been unusually favorable for the insect last spring. According to reports submitted by L. F. Steiner, of the Vincennes, Ind., laboratory, in a single generation the moth population has built up considerably above normal for the first brood in that section. Mr. Steiner says that for the first time in several years the peak of emergence of first-brood moths was higher than that for spring-brood moths. Similar conditions have been reported by Howard Baker, St. Joseph, Mo., for the section of the Missouri River Valley in which he is located.

MEXICAN FRUIT FLY CONTROL

Conditions in lower Rio Grande Valley.--Except for scattered showers during the last few days of June, this area has experienced extremely dry weather. By the end of the month general rains were needed and considerable grove irrigation was being done. No *Anastrepha ludens* Loew were trapped in Texas in June nor were any larvae found in off-bloom fruit removed from the trees. Trap inspections for the whole area totaled 38,408; wild host collections amounted to 917; and 5,359 insect specimens were submitted for identification.

DATE SCALE CONTROL

Control work completed.--Spot inspection was completed in the Imperial Valley during the month and no scale was found. No scale has been found in the Imperial Valley since February 1934, in Arizona since October 1932, and in the Coachella Valley since November 1931. This completes the Federal-State Date Scale Eradication Project.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Infestational ability of hessian flies from hard- and soft-wheat areas.--E. T. Jones, Manhattan, Kans., reports that results of a test to determine the importance of biological strains of flies in hessian fly resistance work show that, although some differences may exist between flies from hard-wheat and from soft-wheat regions, in choice of varieties for oviposition and ability of flies to develop on certain varieties of wheat, the differences are not great enough to affect seriously the results of resistance tests. Results of infestation of wheat varieties with hessian flies from Wichita, Kans., and from Springfield, Mo., are summarized below. Each variety of wheat and each strain of fly is represented by averages based on 150 egg-infested plants in 6 replications of 25 plants each.

Variety of wheat	Wichita flies			Springfield flies		
	Average eggs per plant	Plants infested	Average eggs per puparia	Average eggs per plant	Plants infested	Average eggs per puparia
	Number	Percent	Number	Number	Percent	Number
Illini Chief Sel. 223415 (resistant)	13.3	73.0	2.9	12.4	84.0	2.3
Kanred (susceptible)	12.7	51.0	3.5	15.1	89.0	2.8
Kawvale (resistant)	14.6	79.0	2.8	14.1	95.0	1.7
Marquillo (resistant)	10.7	55.0	5.5	14.1	60.0	5.5
Dawson (resistant)	9.5	78.0	1.5	15.6	78.0	3.1
Averages for all varieties	12.2	67.2	2.9	14.2	67.4	2.6

Resistance of foreign wheats to hessian fly in Kansas.--Mr. Jones also reports that in recently completed greenhouse tests to determine the reaction of 166 varieties and selections of foreign wheat to hessian fly, 3 strains have shown strong resistance to hessian fly development. Gelou (Sel IV y), Renaciminto, and Strain Cl II, three wheats from Uruguay, were infested 18, 32, and 25 percent, respectively. The average infestation of the Marquillo checks was 34 percent and Kawvale, Ceres, and Tenmarq checks were infested 81, 93, and 95 percent, respectively. The average infestation of the 116 strains tested was 92 percent. The average intensity of infestation per infested plant was 14 puparia each and the average number of plants per strain was 31. Plants were tested in uniform duplicate series.

Comparative attractiveness of different small grains to chinch bugs.--C. M. Packard, Lafayette, Ind., reports that as a result of the common observation that chinch bugs tend to congregate in certain small grains in preference to others for feeding and breeding, the question is often raised as to whether or not the complete elimination from a neighborhood of the grains most attractive to the bugs would also eliminate the bugs and their injury to both small grains and corn. The question as to the feasibility of using small plantings of the most attractive grains as trap crops in which to concentrate and destroy the bugs is also frequently asked. The answers to these questions have an important bearing on practical chinch bug control. Field studies have therefore been conducted during the past 3 years for the purpose of obtaining definite information regarding them. The studies show decisively that the small-grain preferences of chinch bugs migrating from winter quarters vary with the climatic character of the spring season and the condition of the respective grains. Under certain conditions any of the small grains, including oats, may become severely infested. While oats are the least attractive, the elimination from an area of all the small grains except oats would not do away with chinch bug troubles, although they might be reduced to some extent. Even where all small grains were eliminated from an area, some infestation developed directly on corn, although infestation in general was probably materially reduced by the absence of small grain. No one small grain was sufficiently more attractive than the others to serve as an effective trap crop in which the bulk of the bugs in a neighborhood could be concentrated and destroyed. These findings are based mainly on actual counts about every 10 days by Curtis Benton of chinch bug abundance in all small-grain fields in several 1-mile-square areas in northern Illinois containing representative crops. A brief summary of the data is given in the following table.

Kind of grain	Number of fields examined in--			Average spring infestation of adult bugs per linear foot of drill row			
	1934	1935	1936	1934	1935	1936	3-year weighted average
Rye	13	5	10	43	13	1.2	22.7
Winter wheat	22	8	23	42	12	0.6	19.5
Barley	7	3	3	20	23	2.5	16.7
Spring wheat	3	2	2	17	13	0.8	11.2
Oats	74	78	86	2	2	.04	1.3

Six varieties of vetch found unattractive to vetch bruchid.--J. S. Pinckney, Carlisle, Pa., has continued research work on Bruchus brachialis Fahr. since April 15. Through the cooperation of R. E. Stitt he has been conducting a nursery of rod row tests at Statesville, N. C., with various varieties of vetch to determine their resistances to Bruchus infestation. The results of the varietal tests for this year have not been completed. The following varieties were found to be entirely unattractive to the bruchid for the purpose of egg deposition: Vicia ludoviciana, V. sativa, V. angustifolia, V. ervila, V. pannonica, and V. monantha. The complete list of varieties grown in these tests is presented in the following table, together with notes as to condition of plants and bruchid resistance. Both V. sativa and V. pannonica are grown in Oregon and V. ludoviciana is grown to a limited extent in northwestern California and western Oregon.

Row	Variety	Effect of winter	Attractiveness to bruchids
A-1----	Vicia ludoviciana (25016)	Some winter killing	Unattractive
A-2----	Vicia sativa (22301)	Uninjured	Unattractive
A-3----	Vicia angustifolia	Practically whole row winterkilled	Unattractive
A-4----	Vicia sativa (02830)	Uninjured	Unattractive
A-5----	Vicia dasycarpa (19130)	Uninjured	Attacked
A-6----	Vicia villosa (29073) Oregon	Uninjured	Attacked
A-7----	Vicia ervila (13410)	Uninjured	Unattractive
A-8----	Vicia villosa (19261) Latvia	Badly winter-killed	Attacked
A-9---	Vicia pannonica (22180)-	Uninjured	Unattractive
A-10---	Vicia villosa (19262) Sweden	Winterkilled in spots	Attacked
A-11---	Vicia monantha	Some winterkilling	Unattractive
A-12---	Vicia villosa (20110) North Carolina	Uninjured	Attacked
A-13---	Vicia atropurpurea	Entirely winter-killed except 3 plants	
A-14---	Vicia dasycarpa (19130)	Uninjured	Attacked
A-15---	Vicia villosa (19198) Hungary	Uninjured	Attacked

New location for corn earworm investigations.--A new location as headquarters for the corn earworm investigations, formerly situated at Rosslyn, Va., has been set up in the Post Office Building, Broadway and East Elm Street, Urbana, Ill., in cooperation with the State Agricultural Experiment Station and Illinois Natural History Survey. Ralph A. Blanchard is in charge. The mail address is P. O. Box 32, Urbana, Ill.

Webster Groves, Mo., field laboratory discontinued.--The field laboratory formerly located at 65 North Frisco Avenue, Webster Groves, Mo., was discontinued effective July 1. A. F. Satterthwait, formerly located there, is now located at the Urbana, Ill., laboratory, where he is continuing his studies of the sunflower insects, bill bugs, and the corn earworm.

JAPANESE BEETLE CONTROL

Aerial scout spots wilted elms.--Aerial scouting with the division's autogiro has proved an efficient method of surveying rough terrain. Systematic autogiro scouting in the northwestern counties of New Jersey was started on June 10. Fifteen suspects were spotted the first week. The flagged or wilted tree is located by the observer on an aerial photographic map. This map is then turned over to a ground crew, which locates and samples the tree. On June 25, Lee A. Strong, Chief of the Bureau, and Paul H. Appleby, Assistant to the Secretary of Agriculture, made flights in the autogiro to observe its practicability as an adjunct to the usual type of systematic scouting.

Scouting for escaped elm logs.--Scouting for 42 miles on both sides of the Passaic River from its source in Somerset County, N. J., to a point in Essex County resulted in the recovery of 47 elm logs that had been floated down stream from clear-cutting areas during the spring floods. In the stretch scouted, the river flows past two clear-cutting areas, the Great Swamp in Morris County and the Great Piece Meadows in Essex and Morris Counties. Twelve logs that had floated approximately 20 miles from the Great Swamp were found on a small island. In the Great Piece Meadow section logs were scattered 1,000 feet inland from the original piles when the river covered the lower portion of the meadows with from 5 to 9 feet of water. Lodged on a mud bank at the far end of the stretch scouted was a 38-foot section of an elm with a butt-end diameter of 32 inches. Logs recovered were loaded on trucks and hauled to burning locations in the swamps.

Dutch elm disease scouting in isolated areas.--Outside scouting is now completely organized at 16 points outside of the major infected zone of New Jersey, New York, and Connecticut. Specimens have been collected from about 1,000 elms. Laboratory reports giving the determinations of about 600 of the samples show them to be divided about equally between *Verticillium*, *Cephalosporium*, miscellaneous diseases, and sterile cultures. Four cases of the Dutch elm disease have been located. One tree at Baltimore and another at Norfolk showed symptoms of infection of 3 years' standing. Two trees at Indianapolis bore evidence of more recent infection. All four elms were in the general area where confirmed trees were found previously. Scouting in the outside areas will be continued with W. P. A. workers during July.

Dutch elm disease scouting in New York State.--During the week ending June 20, the scouting force in New York was increased by the addition of 21 State scouts for work on Long Island, 38 State scouts in Westchester County, and 1 scout on Staten Island. In addition, 10 State-appointed men have been scouting since June 1 in heavily infected spots and in the general vicinity of the isolated infestations. The State scouts have their own area foremen who work as assistants to Federal county supervisors.

Native elm bark beetle observed in two cities.--Reports have been received from the scouts in Kansas City and Louisville that infestations of Hylurgopinus rufipes Eich. have been observed in the two cities. These were not noticed in these cities last year. The beetle population has not built up to the extent found in the major Dutch elm disease zone, but it is possible to find this species.

Locust damage confused with elm disease symptoms.--Scouts working at both Baltimore and Brunswick, Md., report that injury to elm twigs by the periodical cicada had caused wilting, which from the ground is readily mistaken for symptoms of the Dutch elm disease. This has resulted in considerable sampling of trees that otherwise would not be necessary.

Confirmations in June.--Confirmations received from the laboratory during the 4-week period May 29 to June 27 numbered 1,037. During this period a maximum of 890 W. P. A. laborers, 901 C. C. C. enrollees, and 516 Federal and State employees of other classifications were engaged in the work.

Gypsy moth defoliation.--District inspectors throughout the New England area report from 75 to 100 percent less defoliation than was observed last year. Owing to early hatching of egg clusters in some localities, the moth larvae vary considerably in size. A few gypsy moth pupae were observed in Westford, Mass., on June 22. This is unusually early for the caterpillars to pupate.

Wisconsin corn borer clean-up campaign.--Sponsored by the Wisconsin Department of Agriculture and Markets, Wisconsin farmers cleaned up fields that were found infested with the European corn borer by W. P. A. scouts working under State supervision last summer. The farmers were paid $2 per acre for cleaning up their infested fields. This work, performed in addition to their regular cultural practices, consisted in picking up and burning all pieces of cornstalks remaining above ground after the field had been cultivated and seeded to small grain or corn.

Japanese beetle trapping.--By the end of June traps were in operation in St. Louis, Mo., Detroit, Mich., and at a number of points each in Georgia, North Carolina, South Carolina, and Virginia. The earliest beetle capture was on May 30. A few beetles were trapped in 13 communities where infestations were determined in previous years. First records of single beetles each were reported from two cities.

Japanese beetle emergence.--Initial reports of adult Japanese beetle emergence in the regulated area were received from Philadelphia, Pa., on June 2 and Glassboro, N. J., on June 9. The first beetle observed in northern New Jersey was reported from Bloomfield on June 20.

FOREST INSECT INVESTIGATIONS

European spruce sawfly.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports that on June 28 six adult females of the European spruce sawfly emerged from larvae collected at Orange, Conn., on June 15. This indicates that the sawfly completed one generation before July 1 in southern Connecticut. Cocoons were present in the field at Petersham, Mass., on June 22, while on the same date at Tupper Lake, N. Y., in the Adirondacks, the insect had reached the fifth larval instar.

Fir bark louse.--On June 23 Mr. MacAloney conferred at Speculator, N. Y., with H. K. Henry and O. R. Thompson, of the New York Conservation Department, regarding the fir bark louse situation in that State. Several new infested areas have been found near Speculator and some of the larger trees are heavily attacked. About half of the infestations located thus far are on State-owned land and it is expected that the Conservation Department will carry out some experimental control operations during the summer in some of these areas.

Forest tent caterpillar.--J. V. Schaffner, Jr., of the New Haven laboratory, reports on the forest tent caterpillar situation in Vermont, as follows: "A 2-day survey, accompanied by H. L. Bailey, State Entomologist of Vermont, revealed that defoliation was, in most cases, far more extensive in 1936 than in the same region in 1935. Several sugar orchards noted as defoliated in 1935 were again defoliated in 1936. Thousands of acres were from 50 to 75 percent defoliated. Shade trees were completely stripped in many Vermont villages. Sixty-eight sugar maples, representing about one-fourth of an orchard in Bennington, were tagged in 1935 and the tree condition noted. These trees were completely defoliated in 1935 and were reported to have been heavily defoliated in 1934. In 1935 the crown condition on 63 was noted as fair and on 5 as poor. In 1936 the crown condition was as follows: 11, fair; 16, top dead; 8, upper one-fourth dead; 7, upper one-third dead; 11, upper one-half dead; 7, upper two-thirds dead; and 8, dead or dying."

Notes on parasites.--P. B. Dowden and P. A. Berry, New Haven, report on parasite investigations. The final shipment of Coleophora laricella Hbn. material was received from England from W. F. Sellars on June 2. A total of 102,000 full-grown cases of this species were received in May and June. About 20,000 cases are being held at room temperatures while the bulk of the material is held at 50° F. to retard issuance of parasites. To date about 150 male and 50 female Angitia? nana Grav. and 500 male and 500 female Chrysocharis laricinellae Ratz. have issued. Three shipments of hymenopterous parasite material reared from Rhyacionia buoliana Schiff. have also been received from England from W. F. Sellers. This material includes the following material: 177 Omorgus sp. cocoons, 270 pimpline cocoons, and 435 Cremastus interruptor cocoons. These parasite cocoons are being held at 62° to retard issuance of adults. The rearing of Anachaetopsis nitidula Vill. from elm leaf beetle adults received from France last winter was concluded on June 23. A total of 6,329 beetles hibernated successfully but only 57 Anachaetopsis were reared. These were liberated at Assonet, Mass., on June 16. The work with Digonochaeta setipennis Fall. was closed out on June 10 with the liberation of a colony of 249 males and 320 females (most of them mated) at Newport, R. I. About 500 males and 200 females of an undescribed species of Delomerista issued this spring from cocoons of Neodiprion tsugae Middleton collected at Sweet Home, Oreg., last fall. Females readily attack exposed Diprion polytomum Htg. cocoons in the laboratory, laying an external egg on the hibernating host larva. A number of full-grown Delomerista larvae have been obtained, but apparently there is only one generation a year, as no adults have issued. Colonies containing 80 females (mated) and about 200 males have been liberated at D. polytomum infestations at Tupper Lake, N. Y., and Orange, Conn. Messrs. Dowden and Berry report that recovery collections of Coleophora laricella Hbn. and Rhyacionia buoliana Schiff. were completed this month. The imported Coleophora parasite, Chrysocharis laricinellae Ratz., has been recovered for the first time at Sidney, Maine, Berlin, N. H., Sharon, Vt., and Saranac, N. Y. Both males and females were reared at each point. The species was liberated at Saranac and Sidney in 1933 and at Berlin and Sharon in 1935. The only imported parasite recovered from R. buoliana has been Orgilus obscurator Nees. This species was obtained from collections made at Branford and Fairfield, Conn. The Branford record is not new, as the species was also taken there in 1935. The collected material will, however, all be examined for Tetrastichus turionum Htg., which will not issue until next spring.

New parasite unit at New Haven.--Messrs. Dowden and Berry with J. E. R. Holbrook, New Haven, report the completion of a laboratory unit for handling foreign parasite material under quarantine. The unit consists of two rooms each 15 by 30 feet. All windows are supplied with 1/4 inch reinforced, opaque glass. Entrance to the unit is through three doors enclosing two hallways, the one nearer the quarantine rooms being completely dark and the outer one dimly lighted by a trap light. The doors are set in felt. Ventilation is obtained by an 18-inch fan. The entrance and outlet for the air are covered with two layers of 60-mesh copper screening. Facilities are provided for sterilizing all material removed from the unit. One room is furnished with two vaults, each 7 by 6 by 6 feet, where controlled temperature and humidity conditions may be obtained.

Experimental spraying.--S. F. Potts, New Haven, reports that an early and a late series of 1/2-acre plots were sprayed at Assonet, Mass., for the control of the gypsy moth. The outstanding features of these experiments were: (1) Effective control of the gypsy moth was obtained in both the early and later series of plots with a derris spray containing 0.5 percent fish oil at a concentration of 3 pounds of derris per 100 gallons of water; (2) effective control was obtained in the early series of experiments with pyrethrum at a concentration of 3 pounds per 100 gallons of water, with fish oil added; (3) good adherence, no foliage injury, and effective control was obtained in both series with 1-1/2 pounds of calcium arsenate added to a 2-2-50 bordeaux mixture.

More autogiro experiments.--Mr. Potts also reports that nine 10-acre plots were sprayed in two series by an autogiro at Assonet, for the control of the gypsy moth. The lead arsenate and calcium arsenate spray contained, by weight, 1 part arsenical, 0.4 part fish oil, and 2.1 parts water. In the derris spray the ratio of derris to water by weight was 1:6. Excellent adherence, fairly good distribution, and fairly good control was indicated.

Dutch elm disease vectors.--C. W. Collins, of the Morristown, N. J., laboratory, reports that adults of the elm borer (*Saperda tridentata* Oliv.,) and one of the elm bark weevils, *Magdalis armicollis* Say, can carry the Dutch elm disease fungus with them when they emerge from infected trees, as do adults of the smaller European elm bark beetle (*Scolytus multistriatus* Marsh.). The fact that neither *S. tridentata* nor *M. armicollis* have been proved to infect healthy trees is apparently because their adult habits are not so well adapted to transmission of the disease as are those of *S. multistriatus* adults.

Destruction of Douglas fir terminal buds increases seriousness of spruce budworm defoliation.--An epidemic of the spruce budworm has been present within the Douglas fir stands of the Cody Canyon, Shoshone National Forest, for a number of years. For several seasons the trees around resorts, summer homes, and camp grounds have been sprayed in an effort to preserve their scenic values. Although, until this year, this treatment has been successful in preserving the trees within these areas, the seriousness of this season's defoliation has been increased by an unusual injury to the terminal buds. On many of the trees a large percentage of the terminal buds has been destroyed, presumably by some unseasonable climatic condition, and as a result produced no 1936 growth. As only a few of the terminal buds escaped this injury, the feeding of the budworm larvae was concentrated on the surviving new growth, resulting in practically complete defoliation. This concentrated defoliation, with the previous injury to the buds, has resulted in practically a complete elimination of all 1936 growth. The destruction of the terminal buds on Douglas fir is a condition reported from this general area and is in no way due to the budworm injury.

Termite-proofing of buildings gaining recognition.--It is interesting to note that slowly but surely the demands are increasing for reliable information concerning termite-proofing of dwellings, based on proper construction, according to specifications prepared by the Bureau of Entomology and Plant Quarantine. Recently the State Board of Education, Richmond, Va., was supplied upon request with sufficient copies of literature relating to termite control to distribute to each school division in the State. Architects, contractors, builders, and lumber dealers are constantly consulting the Bureau for termite information and often request that illustrated talks be given on the subject. Such a talk was given recently by R. A. St. George before a group of lumber dealers in Bridgeport, Conn., who are interested in getting the proper information before the public regarding the status of the termite problem, because so much misinformation has been disseminated that prospective home owners are afraid to use lumber in buildings any more. Within the past week a development company in the vicinity of Washington revealed plans for constructing a series of buildings and requested that the Bureau supply them with specifications for termite-proofing. It is believed that in the near future home owners will insist upon proper construction of buildings to protect them from termites, just as they now take precautions against fire.

PLANT DISEASE CONTROL

Blister rust control in the Southern Appalachian States.--During the first 6 months of 1936, blister rust control was carried on in six Southern Appalachian States, namely, Georgia, Maryland, North Carolina, Tennessee, Virginia, and West Virginia. During this period 2,036,392 Ribes bushes were destroyed from an area of 291,059 acres. In addition, 12 nurseries and their environs, representing 13,877 acres, were inspected and cleared of Ribes by W. P. A. workers; a nursery at Parsons, W. Va., was protected from blister rust by E. C. W. labor, and another at LeSage, W. Va., was resurveyed for Ribes. Preeradication surveys during this period resulted in the mapping of the white pine on 152,464 acres. On June 30, 424 persons were employed on blister rust control work, of whom 397 were security-wage workers.

Three newly infected counties reported from Wisconsin.--T. F. Kouba, State leader in blister rust control work in Wisconsin, reports that in June blister rust was located for the first time in three new counties: (1) Vilas County, where about 20 fruiting trunk cankers were found on pine, the infection dating back to about 1928, and near which infected Ribes cynosbati plants were also found; (2) Price County, where two branch cankers were found on pine; and (3) Sauk County, where R. cynosbati were found heavily infected.

White pine log drive.--A log drive of 5,000,000 feet of white pine down the Saco River in Maine is being delayed by low waters. This white pine was cut last winter near Fryeburg, Maine. A crew of more than 30 men are working on this drive, which began April 15 and is expected to reach its destination at Biddeford, Maine, sometime in August.

Barberry eradication.--There has been little opportunity so far this year for stem rust to develop because of extremely high temperatures and dry weather. There is a liberal sprinkling of rust throughout the spring-wheat region, but only in areas of North Dakota and Minnesota where wheat is still green is there possibility for further development. Much of the grain, however, is at least badly dried, and this will have a tendency to prevent extensive development of rust, even if there were abundant rains. While it is still a little too early to predict definitely what will happen, the indications are that only in relatively small areas is there likely to be any appreciable damage. In the winter-wheat States east of the Mississippi River, there is little likelihood of damage. From Wisconsin to Ohio, inclusive, wheat is either mature or almost mature and further development of rust is unlikely. The use of emergency funds to employ laborers in connection with the barberry-eradication program during the past year has made possible the destruction of more than 35 million bushes in the 17 States participating in the stem-rust control program. Barberry bushes were eradicated on a total of approximately 50,000 square miles of hill and timbered land along rivers and streams, thus providing a much-needed opportunity to bring under control extensive areas of infestation that had not been reached with regular appropriation funds. During the period from July 22, 1935, to June 30, 1936, an average of 2,265 men were employed and control work was conducted in 278 counties.

COTTON INSECT INVESTIGATIONS

Presquare poisoning for boll weevil control.--K. P. Ewing and R. L. McGarr, Port Lavaca, Tex., report that conditions were favorable for boll weevil control tests during the presquare stage this spring. Several tests were started between May 18 and June 4. Infestation counts, as well as close observations in different fields, showed conclusively that two presquare applications of poison were necessary for boll weevil control. Much better control was obtained where an entire field was treated than where only a part of a field was treated. There was little difference in these tests between the control obtained from calcium arsenate dust and from the molasses mixture applied with a mop. In a test at Edna, Tex., an acre plot (actually 1.36 acres) and an entire field of 9.3 acres were compared. Both were dusted on May 20 and on June 5. On May 18 there were 8 weevils per 100 plants in the untreated check, 7.7 weevils per 100 plants in the acre plot, and 4.7 weevils per 100 plants in the field that was to be treated. On June 4 the number in the untreated check field had increased to 9.5 weevils per 100 plants and had decreased to 4 weevils per 100 plants in the acre plot and 1.3 weevils in the larger field. The square infestations in the untreated check, the treated plot, and the treated field on June 11 were, respectively, 70.7, 34, and 19 percent. By June 18 these infestations had dropped to 45.3, 29.7, and 1.7 percent. By June 25, or 20 days after the second presquare treatment, the infestations were 63, 60, and 30.7 percent. Ewing and McGarr state: "The above infestation records really do not do justice to the excellent control obtained from dusting the entire field, as compared to the field plot. The field was surrounded on three sides by woods. On June 25 this field had practically a bale to the acre set in bolls, whereas the dusted portion of the field plot did not have one tenth of a bale. The planter stated that at least one hundred cars, with from one to five farmers each, coming distances from a few miles to 150 miles, had visited this demonstration and had gone away very much enthused over early season or presquare poisoning."

Boll weevil hibernation and survival at College Station, Tex.--R. W. Moreland and A. B. Beavers report concerning 35,000 boll weevils installed in 70 hibernation cages in the fall of 1935. The total emergence from all cages during May and June was 839 weevils, or 2.4 percent, as compared to 88 weevils, or 0.25 percent, from similar cages in 1935. Of the 15,000 weevils installed in cages in the open field with cornstalks as shelter, 558, or 3.72 percent, survived, whereas only 255, or 1.7 percent, survived in similar cages with Spanish moss for shelter. Of 2,500 weevils installed in the woods on November 1 in cages with Spanish moss, 13, or 0.52 percent, survived, and exactly the same number survived from the 2,500 weevils installed in similar cages with leaves and twigs for shelter. (In 1935 the survival was higher in both sets of experiments in the cages where Spanish moss was used, when in the open field cages 58 weevils survived in Spanish moss to 21 in cornstalks and in the woods 9 survived in the Spanish moss to none in the leaves.) From 10,000 weevils installed on October 15 there was a survival of 23, or 0.23 percent. From 15,000 weevils installed on November 1 the survival was 177, or 1.18 percent, and from 10,000 installed on November 15 the survival was 492, or 6.39 percent. (In 1935 there was no survival from the October-15 installations, only 0.17 percent from the November-1 installations, and 0.65 percent from the November-15 installations.) These tests during both years emphasize the importance of early fall destruction of cottonstalks as a means of reducing boll weevil losses.

Boll weevil population in untreated and treated cotton fields in June.--Messrs. Moreland and Beavers also report that 9 weevils were found on 2,500 cotton plants in bottom-land fields during May, or an average of 1 weevil to 278 plants. On 1,800 plants in upland fields, 51 weevils were found, or an average of 1 weevil to 35 plants. During the week ending June 6, the weevil population decreased in the bottom lands and increased in the upland fields. Only 1 weevil was found in 500 plants of bottom-land cotton examined, but 149 weevils were found on 2,600 plants in upland fields, or 1 weevil to 17 plants. During June, 43 acre-plot applications with calcium arsenate dust and 22 acre-plot applications with molasses-calcium arsenate were made in upland fields to control the boll weevil. During the second week of June, on untreated cotton plants there was an average of 1 weevil to 21.5 plants, while on 600 plants following one presquare application of calcium arsenate 1 weevil was found, and on 400 plants in fields that had received one presquare application of the molasses-calcium arsenate mixture 4 weevils were found. During the third week of June the untreated check plots had an average of 1 weevil to each 21.8 plants, while in the treated plots the average was 1 weevil to 200 plants. The square infestation on the plots receiving presquare treatment ranged from 8 to 44 percent, with an average of 21.2 percent, and in the treated plots the infestation ranged from 0.7 to 3.6 percent, with an average of 2.3 percent. For the week ending June 27 the infestations in the untreated fields ranged from 11.3 to 38.7 percent, with an average of 24 percent, and in the treated plots ranged from 0 to 7.2 percent, with an average of 2.9 percent. In untreated fields of bottom land the infestation ranged from 0 to 27 percent, with an average of 10 percent.

Thrips on cotton in Alabama.--H. C. Young, State College, Miss., investigated a serious infestation of thrips in the cotton fields of Cullman County, Ala., during the last week of June and has started several field tests to determine the value of various insecticides in the control of thrips on cotton. Troy Thompson, of the Alabama Department of Agriculture, wired on June 18 that thrips were causing incalculable damage to cotton in Cullman County. In that county from June 22 to 25 from 40 to 60 percent of the plants in some fields had been so seriously damaged that all of the leaves had fallen off and in some instances the terminal buds had been killed. Many of the damaged plants had begun to put out leaves and branches at all nodes. On July 2 considerable improvement was noted, but from 16 to 40 percent of the plants showed appreciable injury and from 2 to 12 percent were devoid of leaves. Mr. Young concludes: "If favorable weather conditions exist for cotton during the latter part of July and throughout August, it is probable that the damaged plants will produce a fair crop, owing to the extremely light boll weevil infestation. It can be said at present that thrip damage has delayed the setting of the crop from 2 to 3 weeks."

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Trap-plot cotton in the Big Bend.--The trap-plot work in the Big Bend area of Texas has been carried on throughout June. The original program called for 10 plots, ranging in size from 1/4 to 1/2 acre. As one of the plots had to be replanted, the cotton did not get a good start over the field cotton and was therefore abandoned. Another plot had to be eliminated because some field cotton was planted just after the plot, so that there was very little difference in the size of the cotton. All of the remaining plots were worked throughout the month. In view of the increased size of the plots this year it has been impossible to count and inspect all of the blooms daily. Enough blooms had been inspected to give a very good idea of the progress of the infestation. Up to June 20, it was apparent that the number of worms trapped daily was considerably higher than last season. This may be due partly to the fact that the plots are much larger, and it is also possible that the cool weather in April may have delayed the emergence of moths. By the end of the month there was a considerable decrease in the number of worms trapped, indicating that the peak of the moth emergence had passed. The field cotton is now reaching the fruiting stage and a few worms are being found in it, especially in the Castolon section. The plot work will be continued into next month.

Wild cotton eradication.--The eradication of wild cotton in southern Florida was discontinued for this season on June 25. Working conditions were rather disagreeable during the last 10 days work was carried on, but the inspectors desired to continue work until their respective districts were in good shape. During the month a first clean-up was made on 12 acres, from which 725 mature and 5,015 seedling plants were destroyed. A recleaning was made on 1,383 acres, on which 594 mature, 27,497 seedling, and 5,686 sprout plants were destroyed. When work was discontinued all of the known wild cotton area in southern Florida had been cleaned at least once, and many of the locations had been cleaned several times. For the past several seasons many of the more accessible locations have been kept free of mature plants, and at each recleaning there is a noticeable decrease in the number of seedling and sprout plants that occur. Last season a first cleaning was made on over 5,000 acres, and 101,781 mature and 86,158 seedling plants were removed. From the area recleaned 11,350 mature 2,734,676 seedling, and 56,746 sprout plants were removed. The work has been carried on with W. P. A. funds, which has permitted the use of larger crews, thus accounting for the fact that so many mature plants were located and destroyed on areas previously cleaned. The clean-up figures show, however, that 97 percent of the mature plants had been removed during the first clean-up, which, considering the area in which the plants occur, is a very good record. Additional wild cotton bolls were inspected throughout the month and 98 specimens of the pink bollworm found. All of the specimens found this season have been on several keys located off the coast of Dade and Monroe Counties. These are the southernmost counties of Florida, which makes the infestation as far removed from the cultivated cotton as is possible.

Thurberia plant eradication.--Satisfactory progress has been made in eradicating Thurberia plants in the Santa Catalina Mountains of southern Arizona. This work is also being carried on with W. P. A. funds, and during the month 9,760 acres were covered, from which 20,548 plants were destroyed. On June 11, a forest fire broke out about 6 miles west of where the crews were working. Incidentally, this fire was discovered by one of our laborers. During the afternoon the Forest Service requested aid in fighting the fire. All of the men responded and worked on through the night and part of the following day. Other than this there was no interruption. Work in the Santa Catalinas was begun in the southwest corner of the range, and a strip about 2 miles wide has now been covered, extending some 9 miles northward along the westward slope and about 17 miles eastward along the southern slope. Practically all of the plant colonies removed are infested with the Thurberia weevil and, as the work is being conducted to remove this menace from commercial cotton, it will be seen that much good has been accomplished.

Laboratory inspection.--Laboratory inspection of green bolls and bollies collected both within and outside the regulated areas has been continued at San Antonio and a number of field stations. So far this season, the results have all been negative for material originating outside regulated areas. During the month 10 specimens of the pink bollworm were found in bolls collected in the upper El Paso Valley, which is within the regulated area. Laboratory inspection had previously indicated that a light infestation continues to exist in this section.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Pyrethrum dust highly toxic to tobacco moth adults.--W. D. Reed and E. M. Livingstone, of the Richmond, Va., laboratory, report that recent experiments at Richmond in tobacco warehouses of the closed type have shown that dusting with pyrethrum is a very effective method of combating *Ephestia elutella* Hbn. when directed against the adults. The effectiveness of pyrethrum dust was determined by making a comparison between the number of adults of the tobacco moth captured in suction light traps in dusted sections of the warehouse, versus the number captured in undusted sections. This comparison indicated that the pyrethrum dusting operation had reduced the population of tobacco moths by approximately 97.5 percent.

Cube dust mixtures effective against tobacco flea beetle.--E. W. Howe, of the Clarksville, Tenn., laboratory, reports that experiments against *Epitrix parvula* Fab. in tobacco plant beds have indicated that a cube root dust mixture having a rotenone content of approximately 1.5 percent proved to be the most toxic of the materials tested against the flea beetle on dark-fired tobacco, but that a similar dust mixture containing 2 percent rotenone was most efficient in the tests with burley tobacco. In general, however, it appeared that the dust mixture containing 1.5 percent rotenone was so nearly equal to the mixture containing 2 percent rotenone that the former dilution is preferable because of its lower cost. The cube dust mixture proved more effective than a mixture of 50 percent cryolite and 50 percent kaolin, or a mixture composed of 8 percent paris green, 42 percent lead arsenate, and 50 percent kaolin. Results indicated that there was very little difference in the relative toxicity to flea beetles on tobacco plant beds between the two last-mentioned dust mixtures.

Calcium arsenate and sulphur mixture give best results in controlling strawberry weevil.--W. A. Thomas, of the Chadbourn, N. C., laboratory, reports that in experiments to determine the relative value of various dilutions and combinations of insecticides containing rotenone, pyrethrum, calcium arsenate, and sulphur against Anthonomus signatus Say, the most satisfactory material for reducing the number of weevil-cut buds is a mixture of calcium arsenate and sulphur in the proportion of 1 to 5 by weight. The nonarsenical materials proved to be less effective. Although the plots treated with a dust mixture containing 0.5 percent of rotenone ranked first in production of marketable fruit, there was no significance in the number of weevil-cut buds on any of the treated plots except where the calcium arsenate-sulphur mixture was applied. However, the plots where this mixture was applied showed a corresponding decrease in fruit production, indicating that the difference in yield of marketable berries from the different insecticide treatments may be attributable to visible or invisible plant injury induced by insecticide applications and not to an increased production of cull fruits.

Wireworm damage to onions reduced by soil fumigation with naphthalene.--R. S. Lehman, of the Walla Walla, Wash., laboratory, reports that onion plants have been severely damaged by wireworms in the Walla Walla district this year. The principal species of wireworms involved are the sugar beet wireworm (Limonius californicus Mann.) and the Pacific coast wireworm (L. canus Lec.). Detailed studies in one onion field disclosed that 30 percent of the onion plants in one part of the field were destroyed by the wireworms whereas in the remaining part, which had been fumigated with naphthalene in 1934, only 3.5 percent of the plants had been destroyed.

Location of tomato fruit worm eggs on tomato plant.--J. C. Elmore, of the Alhambra, Calif., laboratory, reports that preliminary cage experiments with adults of the tomato fruit worm (Heliothis obsoleta Fab.) have disclosed that nearly 54 percent of the eggs were deposited on the upper surface of the leaves and that 36 percent were deposited on the lower surface. The remaining 10 percent of the eggs were deposited on the stems of the plants, and none of the eggs were deposited on the fruit. If these observations regarding the oviposition habits of the tomato fruit worm moths in confinement are substantiated by field observations, it is believed that advantage may be taken of such oviposition habits in devising control measures for this important pest of tomatoes.

Corn-meal bait more effective than wheat-bran bait against tobacco webworm.--As a result of recent field experiments at Appomattox, Va., J. U. Gilmore, of the Oxford, N. C., laboratory, reports that a bait consisting of 25 pounds of corn meal, 1 pound of paris green, and 1 ounce of oil of mirbane proved more effective against the corn root webworm (Crambus caliginosellus Clem.) on tobacco than a similar bait wherein wheat bran was used as a carrier for the poison and the attractant. In the experiment where corn meal was used as a carrier approximately 2 percent of the plants were killed by webworms, as compared to 5 percent of the plants where wheat bran was used. Approximately 17 percent of the plants were killed by webworms in the untreated check plots.

Field studies indicate source of beet leafhoppers reaching Grand Valley of Colorado.--O. A. Hills, of the Grand Junction, Colo., laboratory, reports that studies to determine the source of beet leafhoppers infesting the western Colorado sugar beet fields this year indicate that the leafhoppers migrated from southern Arizona. These studies further indicated that the leafhoppers reached the Grand Valley by way of the Colorado River drainage, although this route may not have been followed the entire distance from Arizona. Migration studies, wind-vane trap collections, and sweeping operations indicate that April 21 was the probable date that the first beet leafhoppers reached the Grand Valley. The influx of leafhoppers extended over a period of approximately 3 weeks. Studies in the beet leafhopper breeding area of southeastern Utah indicated that this area could not have contributed many insects to the western Colorado beet field populations in 1936.

INSECTS AFFECTING MAN AND ANIMALS

Vitality of house fly observed in spraying experiments.--Conclusions drawn from preliminary spraying experiments with house flies carried out by C. W. Eagleson, of the Dallas, Tex., laboratory, are reported as follows: Of milk-fed flies, the female flies showed a markedly greater resistance to pyrethrum spray than did males. The difference in vitality increases with the age of the flies. Flies fed on a special gel medium showed less difference in vitality of the sexes. Flies from cages receiving different kinds of food displayed a significant difference in vitality. Those receiving the special gel diet lived longer and throughout were more resistant than flies fed banana and milk. The vitality of flies subjected to sublethal but paralyzing doses of pyrethrum was compared. As indicated by initial knockdown and knockdown from subsequent sprayings, such doses of pyrethrum demonstrate no lasting deleterious effects. Flies sprayed at 30° C. recover more quickly than when sprayed at lower temperatures. Within limits, the lower the temperature, the slower the recovery.

Floodwater and snow-pool mosquitoes are persistent pests.--H. H. Stage, of the Portland, Oreg., laboratory, reports: "It has been well established in the vicinity of Portland that any flood of the Columbia and Willamette Rivers over 10 feet will cover the mosquito egg beds and that larvae will hatch there any time after late in March. The first hatching this season was on April 21, when the river rose to a height of 10.7 feet. Larvae were generally abundant over the entire county after that date. In addition to this primary brood, which resulted from the initial rise of the rivers, there were two successive hatchings on May 18 and June 11, respectively. These were occasioned by the two falls and rises of the flood crest. These broods were not as large as the primary brood, but their occurrence did demonstrate how effectively a certain drying of the soil will stimulate remaining eggs to hatch. Adults of Aedes vexans Meig. and A. aldrichii Dyar and Knab were first numerous on May 10 at Portland. These mosquitoes continued to be very annoying throughout June. The mountain or snow species were first reported to be abundant in the Cascade Mountains on May 2 and are still numerous."

Relation of sand fly breeding to type of marsh.--J. B. Hull, of the Savannah, Ga., laboratory, reports: "Samples of soil from different types of marshes were collected during the spring emergence of sand flies. Adult sand flies emerged from soil collected from areas which were previously thought to receive too much tidal action to breed sand flies. Few larvae could be isolated from soil from such marshes, but marsh soil kept in a moist condition in the laboratory did produce adult sand flies. From a series of such samples collected at the edge of marshes that receive no tidal action, sand flies emerged in the following ratio: *Culicoides dovei* Hall, 71 percent; *C. canithorax* Hoppman, 27 percent; *C. melleus* Coq., 2 percent. Samples from the open marsh produced the following: *C. dovei*, 16.5 percent; *C. canithorax*, 80 percent; *C. melleus*, 3.5 percent. During April recovery cages along the edge of marshes captured *C. dovei*, *C. canithorax*, and *C. melleus*. Recovery cages in the open marsh took *C. dovei* and *C. canithorax*. The greater number of *C. dovei* were from cages in the edge of the marsh, while more *C. canithorax* were found in cages placed in the open marsh. These recovery cages have largely given the same results during May and June, with one exception. The percentage of *C. dovei* emerging from cages on tree lines has increased and the percentage of *C. canithorax* decreased. The only *C. melleus* collected from cages was on the edge of marshes. During June few *C. canithorax* were collected from cages. *C. dovei* were collected most frequently, and a few *C. melleus* were taken, all of them from cages on the marsh edge."

Life history of the fire ant.--Bernard V. Travis, who is studying game-destroying insects with particular attention to fire ants in relation to quail on the Forshala Plantation near Tallahassee, Fla., reports: "As many as 1,244 sex forms of *Solenopsis geminata* Fab. were collected from one ant nest. The indicated sex ratio for 910 individuals was 1 male to 1.7 queens. One colony contained 240 sex forms, only 4 of which were males. Exclusive of this colony the sex ratio was about 1:1. Fire ant eggs started to hatch 14 days after oviposition. The eggs are opaque and white when freshly laid, but become transparent as embryonic development progresses. The prepupal period for 59 queens was 5.5 days, with a range of 5-6; this same period for 97 males was 6.1 days, with a range of 5-8. The pupal period for 73 queens was 18.5 days, with a range of 18-21; this period for 125 males was 19.0 days, with a range of 18-21 days."

The effectiveness of sodium cyanide against fire ants.--Mr. Travis also says: "A total of 569 ant colonies that were poisoned with sodium cyanide were marked and placed under observation. The treatment employed consisted of pouring a sodium cyanide solution (1 oz. sodium cyanide to 1 gal. H_2O) into each ant nest. About 1 month after treatment 37.8 percent moved from the original nest, 5.4 percent were active in the original nest, 3.4 percent showed scattered activitiy, and 50.7 percent were inactive. Eighty-eight fire ant colonies were treated with cyanide on a 5-acre tract that had been poisoned five times last year. Only 51.1 percent are inactive at this time (June 22)."

Artificial breeding medium for screwworms.--Roy Melvin and Raymond Bushland, of the Dallas, Tex., laboratory, have developed an artificial medium for rearing larvae of the primary screwworm (*Cochliomyia americana* Cushing and Patton). In this medium normal-sized flies are produced with facility and at very reasonable expense, both for the materials and for the labor involved. Heretofore this species has been reared satisfactorily only in the tissues of living warm-blooded animals. This has been expensive, rather difficult, and not without objections from a humanitarian viewpoint. The medium is made as follows: "To 750 cc of whole milk add 250 cc of citrated blood and 0.5 cc of 40-percent formaldehyde solution. Mix thoroughly in a 6-quart enameled pan and stir in 500 g of ground lean beef. A small piece of wet cotton is added to the mixture to form a raft for the newly hatched larvae. We have found that neither constant nor high temperatures are essential."

Migration of the screwworm flies Cochliomyia americana and C. macellaria Fab. in Texas.--D. C. Parman, of the Uvalde, Tex., laboratory, states: "Migration studies of C. macellaria and C. americana have indicated that C. macellaria travels much more rapidly than does C. americana. Both species overwintered along the escarpment of the Edwards Plateau and southward, but by the first of May C. macellaria had migrated to northern Texas. The C. americana migration from overwintering area was approximately from 50 to 75 miles during March and April, from 125 to 150 miles during May, and from 175 to 200 miles during June. This work has been carried along one usually heavily traveled route, but the several means of transportation included highway, railway, and airplane routes between San Antonio, Dallas, and Fort Worth. The second route has been farther west, where there is very little or no north or south travel. The work indicates that the line of migration has been rather faster where there was no opportunity for traffic, rather than over the heavy traffic areas. The dispersion of C. americana has been rather uniform and there is no indication of any areas in Texas having become infested much before the natural migration."

Work on maggot therapy leads to important medical discovery.--William Robinson, of the Washington, D. C., laboratory, while investigating the means by which blowfly maggots produce their remarkable healing effects in chronic discharging wounds, has discovered a second chemical substance, with outstanding healing properties, which is excreted by maggots into the wound. This material is urea, $CO(NH_2)_2$. Urea has been given thorough tests by a number of physicians and surgeons throughout the country in cooperation with the Bureau and found effective in healing such conditions as osteomyelitis, extensive infected heat and X-ray burns, diabetic and varicose ulcers, infections of the mouth, "athlete's foot", carbuncles, gangrene, and certain skin infections. Wounds that remained unhealed for months under other treatments have yielded promptly to the urea treatment. Urea appears to be as effective as allantoin, the first constituent found to have healing properties, and is very much cheaper. It is reported as soothing in its action, reducing pain and promoting growth of healthy tissue. While urea does not act directly as a bactericide, the number of pus-forming bacteria is rapidly reduced during treatment, probably through increasing cell resistance and stimulation of a vigorous tissue development in the wound. Urea is made synthetically and can be purchased from local pharmacists. An article reporting on its use has been published in the August issue of the American Journal of Surgery.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Nine living larvae of the fruit fly *Anastrepha suspensa* (Loew) were intercepted at New York on April 7 in five guava fruits in ship's stores from Cuba. Thirty living larvae of this fruit fly were collected on January 29 in guavas in the field at Bayamon, P. R. Living adults of the bruchid *Bruchidius dorsalis* Fahr. were taken at Chicago, Ill., on March 4 in seeds of *Gleditschia sinensis* in the mail from Japan. Two living adults of the cerambycid *Neoclytus cacicus* Chevr. were intercepted at San Francisco on October 14, 1935, in lignumvitae logs in cargo from Nicaragua. The larvae of this species were tunneling deep in the wood. A living adult of the chrysomelid *Disonycha militaris* Jac. arrived at Galveston, Tex., on January 13 with banana debris in cargo from Honduras. Living adults of *Taeniothrips fumosa* Trybom were intercepted at New York on January 6 on chinkerichee (*Ornithogalum thyrsoides*) in the mail from South Africa. A living adult of *Anacentrinus deplanatus* Csy. was taken at Brownsville, Tex., on March 7 on an onion in baggage from Mexico. A living adult of the weevil *Brachyrhinus porcatus* Hbst. arrived at Baltimore on March 19 in the packing about violet and cedar plants in the mail from Germany. Two living and two dead adults of the scolytid *Stephanoderes guatemalensis* Hopk. were intercepted at New Orleans on January 27 in a flamboyant (*Poinciana regia*) seedpod in baggage from Mexico. Four living larvae of the weevil *Orthorhinus cylindrirostris* F. arrived at Norfolk, Va., on April 4 under the bark of walnut logs in cargo from Australia. An adult of the chrysomelid *Phytodecta* (*Spartophila*) *olivaceus* Forst. was taken at Washington, D. C., on January 24 with seed of Scotch broom (*Cytisus scoparius*) in the mail from France. A living larva of *Mamestra brassicae* L. was intercepted at New York on January 18 on a cauliflower leaf in stores from Germany. A living larva of this noctuid was taken at the same port on March 2 on a leaf of Savoy cabbage (*Brassica oleracea bullata*) in store from the Netherlands. This insect is not recorded from the continental United States.

Pathological interceptions of interest.--*Aphelenchoides* sp., probably a new species, was intercepted in iris bulbs from Holland on December 17, 1935, at Washington. *Bacterium marginatum* McC. was intercepted from Madeira Islands for the first time on June 22 at New York on gladiolus corms. A nematode closely related to *Cephalobus symetrichus* Thorne but probably a new variety was intercepted in an onion bulb from Portugal on January 10 at Philadelphia. *Cercospora* sp., probably not named and one that would bear watching, was intercepted on March 30, at Washington on *Cypripedium caudatum* from Guatemala. *Cercospora atricincta* Held and Wolf, first interception, was found on zinnias in baggage from Mexico on June 24, at Brownsville. *Coniothyrium olivaceum* Fr., first interception, was found on camellia in mail from Japan on December 9, 1935, at San Francisco. Our first interception of *Coryneum microstictoides* Sacc. and Penz. was made at San Francisco on March 2 on *Paeonia moutan* from France. *Cryptosphaerella* sp., no species reported on wisteria, was intercepted on *Wisteria multijuga* stems from Japan on November 27, 1935, at Seattle. *Cylindrosporium chrysanthemi* Ell. and Dearn., first interception, was found on chrysanthemums from Mexico on June 5 at Brownsville. *Didymosphaeria* sp., no species reported on peony, was intercepted on January 12 at San Francisco on *Paeonia moutan* from Japan.

? Dothiorella dasycarpi Oud. was intercepted on February 28 on a maple from Japan at San Francisco. Dothiorella sp., no species reported on chrysanthemum, was intercepted at San Francisco on February 3 on chrysanthemums from Japan. Gloeosporium aglaonemae Frag. and Cif., first interception determined to species, was found on aglaonema from China on February 17 at San Francisco. Gnomonia aceris Feltg., first interception, was found on maple from Japan on February 11 at San Francisco. Java was added to the list of countries from which Helminthosporium allii Campanile has been intercepted on June 25 at Norfolk, the host being garlic. Heterodera marioni (Cornu) Goodey, first interception and apparently first report for the host, was found producing numerous galls on Artocarpus communis from the Canal Zone on June 6 at Washington. Hexamermis sp., apparently an undescribed form, was found in a carrot from England intercepted on February 17, at New Orleans. Mendogia bambusina Rac., first interception, was found on a native harrow of bamboo from the Philippine Islands when it was intercepted at New York. Paranthostomella sp., no species reported on peony, was intercepted at San Francisco on March 2 on Paeonia moutan from France. Phyllosticta sp., "does not agree with any of species reported on camellia", was found on camellia from Japan on February 28 at San Francisco. Australia, Ceylon, and Siam were added to the list of countries from which Sclerotium oryzae Catt. has been intercepted by collections made at New York on May 23, June 2, and May 1.

Correction.--Further study of the fungus listed as Phyllosticta nigromaculans Sacc., on orchid from Belgian Congo (see News Letter, vol. III, no. 6, page 19, dated June 1, 1936) shows that it is not that species, but its identity has not been established.

Grape insect found in packing.--An example of potential pests which may be gaining entrance into this country as stowaways was the interception at New York on April 22 and April 29 of specimens of Bostrychulus scabratus Erich. in grape packing from Chile. This insect is reported as attacking the woody stems of grapes in Chile and appears to be an insect of economic importance which does not occur in the United States. Messrs. Max Kisliuk, Jr., and C. E. Cooley collected an adult of this insect over a pile of newly dug potatoes in a field at Atuaisol Elqui Valley, Chile, on February 20, 1932.

Pink bollworm intercepted with Mexican tomatoes.--On April 2, a living adult of the pink bollworm was intercepted at Nogales, Ariz., on a tomato in a car of tomatoes shipped from Verdura, Sinaloa, a locality in which pink bollworm is not supposed to occur. The presence of this pink bollworm has not been explained.

Mediterranean fruit fly in candy box.--At New York on May 8 a fancy candy box was found on the deck, where some baggage from Bermuda had just been cleared and removed. The box contained 35 fruits of Surinam cherries (Eugenia uniflora). Of these, 33 were infested with 145 larvae of the Mediterranean fruit fly.

DOMESTIC PLANT QUARANTINES

Extensive areas in Texas inspected for citrus canker.--The search, in cooperation with State inspectors, for citrus canker in Texas has covered nearly the entire Gulf coast area from Orange and Hardin Counties on the north to the southern tip of the State, as well as certain interior citrus-growing counties, since the work was placed on an intensive basis about 18 months ago. A thorough working of the Galveston-Houston area where canker had recurred over a period of years, disclosed the disease on some 35 properties. Inspections were then extended to counties, both to the north and south of this area, and an infection center was located in Jefferson County, and three properties were found with canker in Harris County. More recently, under an expanded program and an increased force, the work was extended to a number of southerly counties, with special attention given to properties on which the disease was found in earlier years. During this 18-month campaign, 23 counties have been worked, of which 4 were found to have infected trees. No canker has been found in this period in the area south of Brazoria County. Properties found infected have been inspected several times. As a result of such repeated and intensive inspections, supplemented by eradication measures effected by relief labor, a marked reduction in canker in this State has been accomplished.

Progress in peach mosaic disease control.--Surveys for the peach mosaic disease have been made during the current field season in orchards and nurseries in 41 counties in Kansas, 16 in Nebraska, and 15 in Iowa, and no instances of the disease have been found in these States. Surveys and inspections now in progress in 31 counties in Texas have thus far brought to light infection in 3 counties in which the disease was not previously known to exist. The peach mosaic had formerly been reported in 10 counties in Texas. In Colorado, a recent survey of 11 peach-growing counties in the eastern section and on the Western Slope, disclosed peach mosaic on one tree each in Montezuma and Garfield Counties. The work is done jointly with State inspectors of these various States, and in the infected area in western Colorado, State inspectors are also serving as foreman and leaders of the 100 men on relief rolls who are destroying diseased and escaped trees and abandoned orchards in this important peach-producing area. The rapid spread of the disease, as observed in the Colorado area in 1933 to 1935 when the annual increase was from four- to five-fold, shows the necessity of prompt eradication in any outbreak of the peach mosaic disease. The marked decrease of infection in that area, as shown by the 1936 survey after the eradication work in previous seasons, also demonstrates the practicability of this method of control.

White pine blister rust control areas established in Ohio.--Zones surrounding a number of nurseries growing white pine in Ohio, including State forest nurseries, have been set aside as blister rust control areas, within which currant and gooseberry plants are required to be removed. Any plantings, nurseries, or parks growing white pines of sufficient value to warrant such protection may be declared control areas, together with the surrounding zones, under provisions of the Ohio regulations concerning the suppression and control of the rust. The European black currant, *Ribes nigrum*, is declared a public nuisance throughout the State and the intrastate shipment of white pines is conditioned upon their protection from the rust since the time of planting the seeds.

Transit inspectors examine cars from Japanese beetle regulated area.--During the early summer when Japanese beetles are in active flight, transit inspectors have arranged their tours so that daily examination of shipments of fruits and vegetables consigned by express and freight from the heavily infested areas may be made to determine compliance with the regulations of the quarantine. At Philadelphia, the screening and covering of containers of restricted articles is being checked by transit inspectors to determine whether the responsible persons are taking precautions to protect the shipments while in transit in the infested area, as required by the quarantine.

Phony peach disease control activities.--Plans for a survey, to determine the possibility of the existence of phony peach disease in States north of the known infected region are being made with plant-pest control officials of the States of Indiana, Ohio, Michigan, Virginia, West Virginia, Pennsylvania, Delaware, New Jersey, and New York, and the work is now under way in Pennsylvania. Similar work is to be done in counties in the States known to be lightly infected. In the more generally infected States inspection of orchards and nurseries has been conducted on 31,067 properties in 11 States to June 15.

INSECTICIDE INVESTIGATIONS

Chemical work on Japanese beetle transferred to Insecticide Division.--Effective July 1, 1936, the chemical work under way in connection with the investigations on the Japanese beetle at the Bureau laboratory, Moorestown, N. J., was transferred to the Insecticide Division. This work includes extensive research in insecticides in connection with the development of more effective materials for both the immature and adult stages of the Japanese beetle, as well as analytical work carried on for the Division of Japanese Beetle Control to determine the additional quantities of lead arsenate needed annually to maintain the required concentration in the soils of nurseries from which stock is certified for shipment outside the infested area. The chemical work is also involved in the problem of the fixation of arsenic in the soil in areas that have been treated and need no further treatment. The transfer of the supervision of this work carries with it the following personnel: R. D. Chisholm, associate chemist; Louis Koblitsky, junior chemist; R. W. Coles, junior scientific aide; J. J. Lockowitz, assistant field aide; H. B. Allen, field assistant. Mr. Chisholm has been designated in charge of the work for the Insecticide Division at Moorestown.

Derris as a repellent for Japanese beetles.--A report has been prepared by Mr. Chisholm covering the laboratory investigations since September 1935 on the effect upon the original deposit of adding various materials to derris, the resistance of the deposits to washing, and the resistance to decomposition by light. A summary of the most important results is as follows: The rosin residue emulsion, type I, can be made more effective as a sticker for derris by increasing the amount of rosin residue from 50 to 66.6

percent, substituting 5.5 percent of gum arabic for the 4.75 percent of ammonium caseinate, and reducing the amount of water from 45.25 to 27.9 percent. The impregnation of derris with rosin before adding the above sticker was found to be the most effective of the methods tested for increasing the amount of the original deposit, enhancing the resistance of the deposit to washing, and in reducing the decomposition of the derris by light. The composition of the best of the derris-rosin combinations is as follows: (a) Derris 65 percent, rosin 10 percent, zinc oxide 25 percent; (b) derris 88 percent, rosin 10 percent, phenol 2 percent; (c) derris 90 percent, rosin 10 percent. Intimately mixing equal weights of derris and sulphur was found to increase the resistance of the deposits to washing and to reduce the decomposition of the derris by light. When derris in combination with rosin and other materials was ground to 100 mesh the deposits were much more resistant to washing than when the materials were of 40 mesh. Impregnating derris with rosin increased the original deposit of derris and the resistance to washing and decomposition by light. Grinding derris with rosin was of no value. Several grades of gum rosin and wood rosin appear to be equally as effective. The addition of violet, yellow, or orange dyes to derris impregnated with rosin increased the resistance of the material to decomposition by light. Red, green, blue, and black dyes gave no better protection than was obtained with rosin alone. Grinding derris with wood charcoal or bone black had little effect upon the resistance of the derris to washing or decomposition. The decomposition of derris is affected by the intensity of the light and by the temperature at which the deposit is exposed.

BEE CULTURE

European foulbrood a menace in California.--F. E. Todd, in charge of the Pacific States Bee Culture Laboratory at Davis, Calif., writes as follows: "European foulbrood is a menace to beekeeping in certain sections of California and many producers consider this problem unsolved. The lack of pollen reserves may affect this situation. Beekeepers in southern California desire to have further work done on European foulbrood as they now fear it more than they do the American form, which has been largely taken care of by the State inspection service."

Airplane dusting causes moving of Bureau's bees.--Mr. Todd also reports that the laboratory colonies which were mostly destroyed by airplane dusting last summer were increased considerably this spring. It was considered advisable to move them from the Davis area rather than expose them again to this danger. Keeping bees at Davis has become impossible during July, August, and September, because of airplane dusting. If the situation continues it will be necessary in the future to consider the cost of moving the apiary as an annual expense to the laboratory.

Impurities the cause of variations in beeswax.--According to Mr. Todd, detailed physical and chemical studies of crude beeswax indicate that impurities (such as propolis and iron stains) are the cause of the extreme variations in the crude waxes. Wax itself is quite a uniform product. A special study of the common impurities is required in order to set up a basis for commercial grading.

Native vegetation a competitor of fruit blossoms in Oregon.--From observations made by G. H. Vansell, also of the Pacific States laboratory, fruit blossoms in the Oregon fruit area have a worthy competitor for the attention of honey bees in the native vegetation. The greater attractiveness of nectars of higher concentrations has been observed repeatedly. Refractometer readings indicate that a number of native plants, such as willow, maple, and mustards, have higher nectar concentrations and would therefore be more attractive than certain fruits.

Queen shippers demanding assistance.--Dr. Warren Whitcomb, Jr., of the Southern States Bee Culture Field Laboratory, Baton Rouge, La., writes that demands for assistance with queen-rearing problems have been received from several shippers but have had to be deferred or refused owing to lack of labor and equipment. One shipper is conducting experiments in his own yard and sending queens and queen cells to the laboratory for testing. In this way advantage can be taken of commercial equipment and the actual measurements and other data can still be handled at the laboratory.

Caucasian bees may be resistant to European foulbrood.--At the Beltsville, Md., laboratory, C. E. Burnside inoculated several colonies with European foulbrood in June. The first inspection on these inoculated colonies seems to indicate that Caucasian bees possess a high degree of resistance to the disease. Pure Caucasian colonies cleaned out the dead brood more promptly than did the other races, the black ones being the least active in this respect.

Advantage of abundant pollen reserves again observed in Colorado.--The abundant pollen reserves in southern Colorado, where one-third of the colonies being used in the supersedure study are located, gave much larger populations of young bees at the close of the inactive season than in the other region located along the South Platte in northeastern Colorado, where pollen reserves were negligible last fall, writes A. P. Sturtevant of the Intermountain Bee Culture Field Laboratory at Laramie, Wyo.

Poor queens are important factor in supersedure.--C. L. Farrar, also of the Intermountain laboratory, writes as follows: " No analysis has yet been made of the influence of brood or added bees on supersedure but the impression has been gained this far in the work that poor queens are the cause of colony replacements of queens other than those lost through manipulation, rather than unbalanced populations. Most colonies superseding had first scattered brood nest and queen cells, followed by loss of the old queen 2 to 4 weeks later, and small, poorly shaped, or injured queens, and so rank high in the loss from supersedure. Queens that showed a good performance at any or all previous examinations have not been superseded."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Only females of the vegetable weevil found.--Evidence supporting the belief that Listroderes obliquus Klug reproduces parthenogenetically and is always thelyotokous was obtained as the result of L. L. Buchanan's dissection of 1,186 Mississippi specimens submitted by the Division of Truck Crop and

Garden Insects, for a determination of sex. All proved to be females.

Additional Museum records for the alfalfa weevil.--Material recently submitted for identification by J. C. Hamlin, of the Division of Cereal and Forage Insects, has included adults, identified by L. L. Buchanan as Hypera postica Gyll., from western Nebraska; also larvae determined as this species by A. G. Boving, from Dawes County, Nebr.; Fall River County, S. Dak., and Eagle County, Colo. These are all new distribution records so far as the Museum collections are concerned.

Association of larva and adult of an interesting clerid.--Recently J. C. Bridwell has succeeded in rearing adults from certain beetle larvae taken in the bark of Pinus rigida near Vienna, Va. The beetles were identified by E. A. Chapin as Lecontella cancellata Lec., the larvae of which have not previously been known. A. G. Boving reports that the larvae provided by Mr. Bridwell represent a valuable addition to the Museum collection. A study of these supports the correctness of Dr. Chapin's establishment of the new genus Lecontella as distinct from Cymatodera, in which the species was formerly placed.

Vesiculaphis caricis (Fullaway) on azalea from Japan.--This aphid, which is known in literature as feeding on sedges, was first found on azaleas in the Department greenhouses by P. W. Mason in 1927. In 1932 it was received on azaleas from South Carolina, and recently specimens intercepted by the Division of Foreign Plant Quarantines, under San Francisco No. 7480, on azalea from Japan, have been identified by Mr. Mason as this species. These accumulating records suggest that azalea is perhaps the alternate host for V. caricis, which is the only species that has been referred to the genus Vesiculaphis.

The aphid Amphorophora azaleae Mason from France.--A single specimen of what P. W. Mason believes to be the alate form of this aphid was taken on azalea plants from France by the Division of Foreign Plant Quarantines under New York interception No. 58692. The species was described from the apterous form only, taken in a nursery at Glen St. Mary, Fla., in 1924. It has remained unknown since that time. This interception from France not only adds the alate form to our knowledge of the species, but also raises the question as to whether A. azaleae is a native of Europe or of America.

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NEWS LETTER

FOR JULY 1936

Vol. III, No. 9 (Not for publication) September 1, 1936

FRUIT INSECT INVESTIGATIONS

Preoviposition period of plum curculio.--Oliver I. Snapp and J. R. Thomson, Jr., have just completed a study at the Fort Valley, Ga., laboratory to determine the period between transformation of females of the plum curculio from pupae to adults and the formation of eggs within their bodies. A number of adults were removed from their soil cells on June 19 and 20, just after they had transformed. The first immature eggs were observed on July 18, but the first fully developed eggs were not observed until July 25. This explains why the new beetles do not begin to deposit second-generation eggs immediately after emerging from the soil. Observations in other years revealed the fact that the individuals of the first generation usually do not begin to oviposit until a month or more after emergence. Studies are also being made to determine the percentage of first-generation females that deposit second-generation eggs during the season in which they emerged. Peach harvest was completed at Fort Valley on July 22 and by that date 45 percent of the new beetles had started to oviposit. Forty-eight percent of the new beetles had begun to deposit second-generation eggs by July 31.

Ability of Japanese beetle to withstand submergence.--I. M. Hawley, of the Springfield, Mass., sublaboratory, reports that beetles have emerged in large numbers from at least four points in New England which were under from 3 to 10 feet of water during the heavy floods last spring. These points are Hartford, Conn., Concord, N. H., and Springfield and West Springfield, Mass.

Native diseases of Japanese beetle in relation to introduced parasites.--On June 23 an exploratory survey was made by R. T. White, Moorestown, N. J., at the Overbrook Country Club, Philadelphia, Pa., to determine the relationship between diseased host grubs of the Japanese beetle and one of the imported parasites, *Tiphia vernalis* Rohw. Thirty-six diggings were made and the grub population averaged 12 per square foot; 48.3 percent were found to be parasitized by *T. vernalis*; 26.9 percent of all larvae were diseased; and 18 percent of the *Tiphia*-parasitized grubs were so diseased that the parasites would be unable to develop upon them.

Percentage frequencies of stages of Japanese beetle in July.--T. N. Dobbins, Moorestown, reporting on the percentage frequencies of stages of the soil population of Japanese beetle for July 1936, submits a comparison of the situation for July 1935 and 1936. The following table summarizes the relative proportion of the various stages represented among the soil population by 10-day periods during July 1935 and 1936.

Periods	Percentage frequency of--						
		Larval instars					
	Eggs	1st	2d	3rd	Prepupae	Pupae	Adults
1935							
July 1-10----	3.9	0	0	19.3	3.4	20.8	52.7
July 11-20----	77.3	8.8	0	6.3	0.9	3.8	2.7
July 21-31----	63.3	34.2	0	0.6	0	0	1.7
1936							
July 1-10----	0	0	0	40.5	11.9	26.2	21.4
July 11-20----	34.8	0	0	38.1	5.0	22.0	0
July 21-31----	82.7	11.8	0	4.7	0	0	0.7

As shown by the table, a decided retardation has occurred during the present year in the replacement of the older brood by a new brood, the new brood being represented in the table by the eggs and the first-instar larvae, the remaining stages representing the old brood. This condition is due, in large part at least, to the extremely dry soil conditions that have prevailed during the present season, delaying the development of the insect and, particularly, the laying of eggs during the current season.

Seasonal fluctuations in soil population density of Japanese beetle at regular survey stations.--I. M. Hawley and T. N. Dobbins, Moorestown, report that one of the outstanding features of the present season has been the unusually heavy reduction in the soil population which has occurred at the points of survey during the period September 1935 to June 1936. A summary of soil population surveys conducted over a period of 7 years indicates that the reduction in soil population during the above-mentioned period is normally approximately 35 percent. The following summarizes the reduction in population at the regular survey stations during the same period in 1936: Merchantville, N. J., 91.4 percent; Haddonfield, N. J., 81.0 percent; Jenkintown, Pa., 75.0 percent; Rydal, Pa., 74.2 percent; Philmont, Pa., 56.7 percent; general average, 75.6 percent.

MEXICAN FRUIT FLY CONTROL

No fruit flies trapped in lower Rio Grande Valley.--July trapping results in the valley, as regards Anastrepha ludens Loew, were identical with those for the same month the last 4 years, that is, no A. ludens was trapped. As usual, several A. ludens were trapped in the city of Matamoros, but no larval infestations have yet been found in any of the fruit grown locally. The absence of larval infestations in Matamoros and Reynosa is probably accounted for by the strict sanitary measures being enforced around the markets and the close inspection of all fruit before it is offered for sale. Weather and growing conditions for the present citrus crop have been excellent during the past month.

CEREAL AND FORAGE INSECT INVESTIGATIONS

European corn borer survival.--A. M. Vance, Toledo, Ohio, reports that the mortality of overwintering European corn-borer larvae remained relatively low in most parts of the infested territory and that the insect in general appeared to reach pupation in a vigorous condition. However, a comparatively high pupal mortality, of 21 percent among 911 specimens examined, was found by K. D. Arbuthnot in a series of counts taken from July 15 to 21 within 10 Ohio and Michigan counties west of Lake Erie. This mortality was a result of prolonged intense heat early in July. On the other hand, preliminary data obtained in the vicinity of Toledo indicate a good survival of borers from a large number of egg masses deposited. In both the Lake and Eastern States the average seasonal development of the borer was earlier in 1936 than in 1935. Egg deposition of the first-generation moths in southern Connecticut this year occurred fully 1 week earlier than last year, about the same number of eggs being laid in each of the 2 years. Despite heavy precipitation in that region during the period of oviposition and egg hatching, a relatively small proportion of the egg masses were washed off the plants and early larval survival of the first generation was apparently as high in 1936 as in 1935. In western New York oviposition has been light this season and on the Eastern Shore of Virginia, according to D. W. Jones, unusually dry conditions resulted in a low survival of the first-generation corn borer and a consequent light infestation.

Status of European corn borer parasites at the close of 1935.--W. A. Baker, Toledo, reports that surveys were conducted at the close of the 1935 season of parasite activity. The collections were confined to restricted areas around 10 test points for parasite colonization, in four States in the one-generation area, and 11 points in six States in the multiple-generation zone. With few exceptions, each of these points was sampled by the section random-sampling method, the location of samples being determined by the use of polar coordinate designs of a type suitable to the objectives sought at each point. The following tables present the results of observations in these two areas.

Parasites taken in one-generation area[1]

Locality	Total borers observed	Foreign						Native and undetermined [2]		Total	
		Lydella grisescens R. D.		*Inareolata punctoria* Roman.		*Chelonus annulipes* Wesm.					
	Number	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Indiana											
York, Steuben	441	0	0	0	0	0	0	0	0	0	0
Michigan											
Fairfield, Lenawee	678	0	0	0	0	0	0	0	0	0	0
Erie, Monroe	5,174	110	2.14	1	0.02	0	0	23	0.45	134	2.61
Oxford, Oakland	698	0	0	0	0	0	0	0	0	0	0
Columbus, St. Clair	499	0	0	0	0	0	0	2	0.40	2	0.40
New York											
Catt. Ind. Reserv.	897	0	0	1	0.11	0	0	11	1.23	12	1.34
Adams, Jefferson	675	0	0	0	0	0	0	1	0.01	1	0.01
Ohio											
Perkins, Erie	3,839	9	0.24	0	0	1	0.03	12	0.31	22	0.58
Jerusalem, Lucas	5,142	223	4.36	0	0	0	0	28	0.54	251	4.90
Perry, Wood	676	0	0	0	0	0	0	0	0	0	0
Total	18,719	342	1.84	2	0.01	1	.01	77	0.41	422	2.27

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[1] Percentage of parasitization based on the number of borers observed minus the number lost.

[2] One *Labrorychus prismaticus* Nort. from Erie Township, Monroe County, Mich., and one from Adams Township, Jefferson County, N. Y.; remainder mostly *Zenillia caesar* Ald.

Parasites taken in multiple-generation area[1]

Locality	Borers collected	Foreign Lydella stabulans var. grisescens		Inareolata punctoria		Chelonus annulipes		Cremastus flavo-orbitalis		Native[2]		Total	
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Massachusetts													
Bridgewater-----	697	3	0.43	0	0	0	0	0	0	2	0.29	5	0.72
Dighton--------	692	54	7.85	36	5.23	34	4.94	0	0	2	0.29	126	18.60
Falmouth-------	438	26	5.95	15	3.43	0	0	(3)	(3)	0	0	41	9.38
Malden---------	2,927	131	4.48	211	7.22	0	0	0	0	3	1.02	345	11.80
Rhode Island													
E. Providence--	1,181	47	3.99	8	0.68	0	0	0	0	0	0	55	4.66
Portsmouth-----	661	21	3.18	17	2.58	0	0	0	0	0	0	38	5.77
Connecticut													
E. Hartford----	589	11	1.87	18	3.07	0	0	0	0	1	0.17	30	5.11
Milford--------	675	1	0.15	0	0	(3)	(3)	0	0	2	0.30	3	0.45
New York													
Long Island----	2,337	82	3.51	4	0.17	0	0	0	0	8	0.34	94	4.03
New Jersey													
Atlantic-------	417	2	0.48	(3)	(3)	(3)	(3)	2	0.48	0	0	4	0.96
Virginia													
Lee------------	408	1	0.25	(3)	(3)	(3)	(3)	0	0	0	0	1	0.25

[1] Percentage of parasitization based on number of borers collected minus those lost.

[2] Includes the following species: Zenillia caesar, Bassus agilis (Cress.), Phorocera erecta Coq., Nemorilla maculosa Meig., Labrorychus prismaticus.

[3] No release of this species at this point.

In the one-generation area, Lydella stabulans var. grisescens R. D. appeared at 3 of the 10 points surveyed and at each of these points it had extended its limits of spread. In Jerusalem Township, Lucas County, Ohio, it was found that the area from which parasites were recoverable was approximately double that of last year. At this point parasitization in 2 of the fields was over 49 percent. Recoveries were made in close proximity to Lake Erie. Comparable data on percentage of parasitization for 2 years in the vicinity of these points are as follows:

Year	Within radius from release point of---	
	1½ miles	3½ miles
1934----	11.53	8.33
1935----	10.06	6.55

The difference in parasitization within 1½ miles of the release point was statistically insignificant, whereas within the larger area there was apparently a 21-percent decrease. In this county, however, between 1934 and 1935 a decided increase in host population was recorded. The host increase, combined with the decided enlargement of the parasitized area, probably indicates a substantial increase in parasite population within the area observed. Inareolata punctoria Roman was recovered from the same points at which it appeared last year. No increase in numbers was indicated. One specimen of Chelonus annulipes was recovered from Perkins Township, Erie County, Ohio. Adults were released at this point in 1934, and no supporting releases were made in 1935. During the course of egg studies in July 1935, egg masses were observed to be parasitized by Trichogramma minutum Riley in the vicinity of Toledo, Ohio, and Rochester, N. Y., the first known record of this species as a parasite of Pyrausta nubilalis Hbn. in the one-generation area. Parasitization of borers by all native species remained low in 1935. Zenillia caesar appeared most frequently in the collections. A comparison of corn-borer parasitization in the multiple-generation area, in 1934 and 1935, based on figures derived by comparable methods, is presented in the following table:

Location	1935	1934
Massachusetts		
Bridgewater------------------------	1.07	3.51
Falmouth---------------------------	10.96	12.76
Malden-----------------------------	16.05	15.87
Connecticut		
Hartford---------------------------	6.09	1.99
Milford----------------------------	0.51	0.75
New York		
Long Island------------------------	4.57	1.90
Rhode Island		
Providence (Sec. 1-7)--------------	6.49	5.76
Portsmouth-------------------------	9.31	1.83

It is apparent that there was little change in percentage of parasitism in the Malden, Mass., and Providence, R. I., areas in the fall of 1935, as compared with the previous year. Bridgewater and Falmouth showed a decrease, whereas Hartford, Conn., Portsmouth, R. I., and Long Island, N. Y., showed marked increases in parasitization.

Corn-borer infestation in early market sweet corn near Toledo.--A. M. Vance and K. D. Arbuthnot, Toledo, report that 25 fields, comprising 114 acres, of market sweet corn located west of Toledo, planted late in April and early in May, were surveyed for corn borer infestation from July 15 to 31. An average infestation of 469 borers per 100 plants was found. In 1935 an average of 328 borers per 100 plants was obtained in a similar survey in this locality. Populations of the insect in individual fields examined in 1936 ranged from 220 to 990 borers per 100 plants, with 60 percent of the fields showing over 400 borers per 100 plants.

Summer pupation of corn borer at Toledo.--K. D. Arbuthnot reports as follows on summer pupation of corn-borer larvae in the vicinity of Toledo: Pupation that normally should occur in June 1937 occurred to a greater extent in 1936 than has such pupation during any previous year on record. In a total of 1,314 individuals observed from July 28 to 31 in early sweet corn, 81 pupae were found, representing an average pupation in this crop of 6.2 percent. Four of the pupae had already emerged and egg masses deposited by second-generation moths were found in late corn on August 6. During 1934 and 1935 pupation in the locality was almost negligible, less than half a dozen pupae being found in either of the 2 years.

Laboratory production of corn-borer egg masses.--G. T. Bottger reports that to provide corn-borer eggs for hand infestation of corn plants in experimental plots concerned with studies on varietal and cultural control during June and July at Toledo, a total of 102,333 egg masses were produced as a result of collecting 47,011 moths from large field cages and handling them under controlled incubator conditions. The average number of masses laid per female moth was 5.66, and the average number of eggs per mass was 29.46.

Shipments and liberations of corn borer parasites in July.--C. A. Clark, Moorestown, N. J., submits the following data.

State	C. flavoorbitalis	I. punctoria	M. tibialis	L. stabulans	Total
New Jersey---	600	600	--	600	1,800
Virginia-----	2,400	1,200	--	3,900	7,500
Ohio---------	--	9,000	--	--	9,000
New York-----	--	1,800	--	--	1,800
Pennsylvania-	--	--	--	2,000	2,000
Connecticut--	--	1,800	--	--	1,800
Canada-------	10,800	600	2,025	4,500	17,925
Total----	13,800	15,000	2,025	11,000	41,825[1]

[1] Some of the parasites shipped or liberated during July emerged in June.

Mr. Clark states that shipments to Virginia were for release in Virginia and Maryland, those to Ohio for release in Ohio, Indiana, and Michigan, and those to Connecticut for release in that State and in Massachusetts.

Winter wheats lack resistance to hessian fly in Kansas.--E. T. Jones, of the Manhattan, Kans., laboratory, reports that the wheat harvest of 1936 and the hessian fly infestation records of last fall on 214 rows of 104 supposedly resistant selections of winter wheat show the winter wheats to be far more susceptible to hessian fly infestation than was an F_4 winter selection of Marquillo x Oro. This selection, bearing a fall infestation of 38 percent, averaged 117 heads to a row in our Springfield, Mo., fly-resistance-test nursery. The 104 winter wheats in the same comparable duplicated series, owing to killing by a 99 percent fall infestation of fly, averaged only 9.7 heads to the row, with a maximum of 44 heads for a Kawvale x Tenmarq selection. Selections of Marquillo x Oro, Marquillo x Tenmarq, Marquillo x Minturki, Kawvale x Marquillo and (Kanred x Hard Federation) x Marquillo in another test series at Springfield, Mo., proved to be equally as resistant to hessian fly injury as the Marquillo-Oro hybrid.

Hessian fly in the Eastern coastal regions.--Hessian fly surveys made by E. J. Udine, of the Carlisle, Pa., laboratory, showed that light infestations were present in Virginia, Delaware, Maryland, and eastern Pennsylvania. Heavier infestations were found in central and western Pennsylvania, with a maximum of 54 percent in one field in Union County.

Colonization of Collyria calcitrator Grav. for wheat sawfly control.--In continuation of the colonization work with this species begun last year, a record supply of these parasites was shipped to this laboratory by the Canadian Department of Agriculture. They were met at Buffalo by E. J. Udine and were distributed at four points located in Ontario County, N. Y., Cumberland and Butler Counties, Pa., and Mahoning County, Ohio. A total of 10,340 adults were released. Weather and host conditions were optimum for successful colonization.

Pleurotropis benefica Gahan as a parasite of the black grain-stem sawfly.--On June 4 Mr. Udine released 125 P. benefica in wheat fields near Ellsworth, Mahoning County, Ohio. In eastern Pennsylvania this chalcidoid is a major parasite on the black grain-stem sawfly (Trachelus tabidus Fab.). This sawfly, however, has disseminated much faster than P. benefica, with the result that the heavy outbreaks of T. tabidus in eastern Ohio have occurred unchecked by parasitization. Careful search has failed to reveal the occurrence of P. benefica in the parts of Ohio where the wheat was most heavily attacked. It was, therefore, the purpose of this experiment to encourage its presence by planting a colony in the heart of the most heavily infested area.

Vetch bruchid infestation heavy in vetch in North Carolina.--According to J. S. Pinckney, this summer Bruchus brachialis Fahr. has been found heavily infesting vetch seed in all counties in which infestations were found last year and also in four additional counties in the State, these counties being: Alexander, Anson, Montgomery, and Richmond. Infestations have averaged at least 50 percent in all fields examined and have run as high as 90 percent. Weevils were still emerging from this year's seed on July 17, but the peak of emergence was reached on July 11.

Wheat sawfly in the East.--Surveys made this summer by Mr. Udine, Carlisle, Pa., for wheat sawflies (T. tabidus and Cephus pygmaeus L.) showed the range of both pests steadily increasing, with C. pygmaeus, which was originally confined to New York State, now also getting a firm foothold in eastern Pennsylvania, and T. tabidus spreading farther west in Ohio and becoming well established in Virginia. Mr. Pinckney found it present in Campbell County in southern Virginia, but no traces of it as yet in North Carolina. Damage from this pest was not as severe this summer as last in Pennsylvania, owing to the early ripening of the grain, which enabled wheat growers to harvest a few days prior to the complete severance of the stems by the sawfly larvae. The peak of infestation this year was found in Mercer County, Pa., and in parts of eastern Ohio.

JAPANESE BEETLE CONTROL

Status of Dutch elm disease eradication.--From the beginning of scouting on June 8 to the end of July, scouts sampled 30,189 trees showing wilting symptoms. Of this total, 4,334 have been confirmed as infected with the Dutch elm disease. Sixty of these were in Connecticut, 3,073 in New Jersey, and 1,179 in New York. Infections outside the tri-State area comprised 19 trees in Indianapolis, and one each in Old Lyme, Conn., Baltimore, Md., and Norfolk, Va. On July 31 there were 189 W. P. A. and 95 C. C. C. scout crews in the field. Men employed on relief funds numbered 2,161. There were also engaged in the work 439 C. C. C. enrollees, 61 appointed and 12 per diem men on Department funds, 137 W. P. A. supervisory appointees, and 171 State employees. In the first survey of the work area, scouts had covered 3,953 square miles, and 1,395 square miles had been gone over twice. Progress in the season's scouting in most sections at the end of July was equivalent to the accomplishments as of late August in 1935. Tree-removal work was being performed by 27 eradication crews and 7 sanitation crews. Confirmed trees standing numbered 1,937. Trees removed to July 31 in connection with this and previous years' eradication, sanitation, and clear-cutting activities totaled 1,710,614.

Railroad scouting organized.--Organization of railroad scouting began on July 31 and was completed on August 3. One four-man crew will scout the Baltimore & Ohio railroad right-of-way from Harpers Ferry to Clarksville, W. Va. This survey will cover trees in a strip one-quarter mile on either side of the railroad, increasing to one-half mile in towns. Ten two-man crews will scout the other railroads over which elm logs traveled to veneer mills.

Moth defoliation in New England.--Reports from district inspectors concerning observations of gypsy moth defoliations continue to indicate a considerable decrease in the number of acres showing from 75 to 100 percent defoliation, as compared with last summer. In towns located within a radius of 25 miles of Boston, a comparative increase in the degree of defoliation is reported. Satin moth infestation is reported by the inspectors to be heavier and more generally spread throughout the infested area than during the past several years. The satin moth is now present in all four stages--caterpillars, pupae, moths, and egg clusters.

Gypsy moth quarantine violator convicted.--After pleading guilty to a violation of the gypsy moth quarantine regulations involving the shipment via boat of 344 cedar poles from Stonington, Conn., to Greenport, N. Y., Frank Shippee, of Westerly, R. I., was sentenced to pay a fine of $25, to a 1 month's suspended jail sentence, and was placed on probation for 6 months.

Early deposition of egg clusters.--Report has been received from the district inspector at Concord, N. H., that gypsy moth egg clusters were deposited in southern New Hampshire as early as June 30.

Heavy concentrations of Japanese beetle in Metropolitan area.--There are heavy infestations of the Japanese beetle in practically all of the Metropolitan district surrounding New York City. One of the heaviest infestations is reported on Governors Island, in New York Harbor. Similar conditions exist at Bedloes and Ellis Islands. Although there is but a limited amount of foliage at the immigration station on Ellis Island, the beetles have eaten the ivy that covers part of the building. Staten Island may be considered generally infested, with considerable beetle damage in all sections of the island. A motor-boat owner cruising in Raritan Bay reported that beetles flew aboard his craft and practically covered the decks. Fire buckets of water on ferry boats plying between Hoboken and Coney Island contain a layer of floating beetles. This year's flotation of beetles that have flown to sea and been swept back by the tides has been in progress since about July 15. Windrows of dead adults may be found along the southern shore of Long Island as far east as Long Beach. The beetles have also reached the nuisance stage in Brooklyn, from Fort Hamilton north to Columbia Heights. Upper Manhattan and the Bronx are also invaded with a greatly increased beetle population. Communities along the Hudson River north to Hastings upon Hudson are badly infested. In New Jersey heavy infestations have been observed in sections of Essex and Hudson Counties.

Accrediting of bean-growing farms discontinued in Maryland and Virginia.--Men assigned to scout bean farms on the Eastern Shore of Virginia and the Eastern and Western Shores of Maryland as a means of accrediting the farms and permitting certification without inspection of produce from uninfested premises found first-record infestations on 41 farms in Maryland and 42 farms in Virginia. This indicates that the beetle has spread quite generally throughout the bean-growing sections. Accordingly, it was necessary on July 16 to discontinue farm scouting as previously practiced over a period of years and to require that all beans from these areas be given actual inspection before being loaded in cleaned or fumigated refrigerator cars for removal from the regulated zone. Maryland State officials have obtained 12 W. P. A. workers to assist in the bean-inspection work. Some of these men will start to work on July 27.

Single adult beetle may spread infestation.--Ordinarily, finding of one adult Japanese beetle in a lot of material intercepted at a road station involves little hazard of spread of the pest. This, however, was not the case with a potted plant intercepted at the Amissville, Va., post on July 17, in the possession of a motorist driving from Noank, Conn., to Louisville, Ky. While removing the soil from about the plant preparatory to certifying it, the inspector found a female adult beetle in the act of oviposition, three eggs having just been laid. Judging by the conditions of infestation in the locality where the plant originated, the eggs were probably fertile.

Berry fumigation resumed in New Jersey.--Fumigation houses at Whites Bog and Hammonton, N. J., are now in full operation. Raspberries and blackberries purchased at the community auction market at Hammonton are the products fumigated at that point. Fumigation at Whites Bog is confined to cultivated blueberries shipped to nonregulated points by the cooperative grower's association. Carbon disulphide is the fumigant used at both houses. The extreme heat that prevailed throughout New Jersey during the week ending July 11 threatened to curtail the blueberry crop, as the green berries were literally cooked on the bushes.

Japanese beetle emergence in New England.--Japanese beetles were first noted in Concord, N. H., on June 30 and in Keene, N. H., on July 7. The first beetle was trapped in Boston this season on July 9, the day the traps were set. Sixteen hundred traps have been placed by the Park Department of Springfield, Mass. The first beetles caught in the city-owned traps were captured on June 27. These traps are now catching an average of 1,000 beetles per day. On July 4, 1,600 beetles were caught.

FOREST INSECT INVESTIGATIONS

Douglas fir beetle.--A survey of the Douglas fir beetle infestation in the Shoshone Canyon, Shoshone National Forest, Wyo., was instituted on August 3 by A. L. Gibson, of the forest insect laboratory at Coeur d'Alene, Idaho. Artificial control measures, first instituted in 1931, have successfully preserved the scenic trees along the highway and around the many resorts and summer homes. If control measures are again found to be necessary the work will be conducted by C. C. C. enrollees.

Cooperation in study of blue stain.--J. C. Evenden, Coeur d'Alene, states that Caroline Rumbold, forest pathologist of the Bureau of Plant Industry, who is located at the Forest Products Laboratory, Madison, Wis., visited the Coeur d'Alene laboratory district during the last week of July for the purpose of obtaining cultures of blue stain associated with the mountain pine beetle.

C. C. C. enrollees used to study mountain pine beetle infestation.--Mr. Evenden also states that a crew of ten C. C. C. enrollees are being used on the Coeur d'Alene National Forest as assistants in the making of an intensive study of the mountain pine beetle infestation in white pine. This study includes the analysis of bark-beetle broods under all environmental conditions and periods of attack. In the execution of this work trees are felled and brood data are taken at different heights along the infested length of the bole.

Two-year cycle of Black Hills beetle at high elevations.--J. M. Whiteside, of the Fort Collins, Colo., laboratory, reports that between elevations of 9,000 and 10,000 feet in southern Wyoming, a period of nearly 2 years is required for complete development of parts of some broods of the Black Hills beetle. From limber pine and lodgepole pine trees attacked in 1934 he obtained large numbers of beetles during the summer of 1935, although in November, when the emergence ceased, there were still many mature larvae and callow adults beneath the bark. These insects emerged heavily late in June and early in July in 1936 and attacked a great many additional trees. From a cage covering 2 square feet of bark on the north side of a limber pine tree attacked in 1934 he collected 204 beetles in 1935. From this same cage emergence began again late in 1936 and by the end of the first week in July, 81 additional beetles had emerged. A smaller number were collected from other caged trees. These "second season" beetles can be found in the dry outer bark from the ground line to a height of about 6 or 8 feet. An occasional larva or pupa can still be found in the very dry bark. Emergence and attack by these "second season" beetles occurring late in June and early in July is about 6 weeks earlier than the main flight, which usually occurs late in August at this elevation.

The lodgepole pine beetle considered in marking lodgepole and white-bark pine stands.--J. A. Beal, Fort Collins, reports that on the Washakie National Forest in northwestern Wyoming Dendroctonus murrayanae Hopk. is a very important factor in the death of mature lodgepole and white-bark pine trees in the vicinity of the operations.

Trap-tree experiments for Dutch elm disease vectors.--C. W. Collins, of the Morristown, N. J., field laboratory, reports that a trap log experiment has been conducted by that laboratory in cooperation with the Dutch elm disease eradication unit, the Morristown laboratory of the Division of Forest Pathology of the Bureau of Plant Industry, and the State officials engaged in Dutch elm disease eradication in New Jersey, New York, and Connecticut. Four pieces of elm about 3 feet in length and from 3 to 6 inches in diameter were put out at each of 466 points within and just outside the major disease area. These points were approximately 4 miles apart. The logs were cut outside the area just before they were placed at the points. After an exposure of approximately 4 weeks they were brought into the laboratory and peeled. The number of galleries of the smaller European elm bark beetle (Scolytus multistriatus Marsh.) and the native elm bark beetle (Hylurgopinus rufipes Eich.) were counted and sample galleries and beetles were submitted to the Division of Forest Pathology. These were cultured to ascertain whether or not the Dutch elm disease fungus (Ceratostomella ulmi (Schwarz) Buisman) was present. Some of the logs were heavily infested with the bark beetles, whereas many sets of logs were uninfested. The fungus was recovered from galleries of both bark beetles in logs that were exposed at points within the known infected zone.

Insects attracted to cut elms.--Mr. Collins also reports concerning progress of another experiment in which the Morristown laboratory and the Dutch elm disease eradication unit are cooperating. Since late in May a man has been stationed at each of six points located in New Jersey areas where elms are numerous and where trees attacked by the Dutch elm disease have been and are being removed. These men collect insects attracted to three felled elm trees. Six weeks after a tree has been felled it is burned and another is felled in its place. The insects are collected alive and individually in gelatine capsules and sent to the laboratory for identification. After they have been identified those insects known to breed in elm are submitted to the Division of Forest Pathology for culturing to determine whether they are carrying the Dutch elm disease fungus. Adults of Scolytus multistriatus have been collected in greatest numbers, but the elm bark weevils, Magdalis armicollis Say, Magdalis barbita Say, and Magdalis inconspicua Horn., and the red-headed ash borer (Neoclytus acuminatus Fab.) have been frequently taken. Other beetles taken in smaller numbers are Hylurgopinus rufipes Eich., Saperda tridentata Oliv., Chrysobothris femorata Oliv., Anthaxia viridifrons Say, Xylotrechus colonus Fab., and Xylobiops basilare Say. At one point the introduced ambrosia beetle (Xylosandrus germanus Bldfd.) and the cambium curculio (Conotrachelus anaglypticus Say) have been commonly attracted to the felled trees. The Dutch elm disease fungus has been cultured from S. multistriatus beetles collected at four of the points and from H. rufipes adults from another point.

European spruce sawfly.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports a high emergence of adults of the European spruce sawfly from cocoons collected on July 1 and 2. From 269 cocoons, 245 adults issued, two being males--the first males reported from the United States. Three cocoons produced hymenopterous parasites. On July 31 all instars of this sawfly were present at Orange, Conn. Apparently some larvae of the second generation were ready to spin cocoons. A recent survey of conditions in northern New Hampshire and Vermont indicated no apparent increase in sawfly infestation. It is everywhere light in this region.

Imported parasites of pine shoot moth.--P. B. Dowden and P. A. Berry, of the New Haven laboratory, report that the following pine shoot moth parasites were received from England during July: 8,283 cocoons of Cremastus interruptor Grav.; 1,800 cocoons of Orgilus obscurator (Nees); 240 cocoons of Omorgus and miscellaneous species; and 916 naked pupae of Pimpla sp. A shipment of 1,040 pine shoot moth eggs, said to be parasitized by Trichogramma, was received from Austria via Hyeres, France.

Parasite liberations.--Messrs. Dowden and Berry report that the following parasite liberations were made during July:

Locality	Host species	Parasite			
		Species	Males	Females	Total
			Number	Number	Number
Connecticut					
Branford----------	*Rhyacionia buoliana* Schiff.	*Cremastus interruptor*	50	400	450
Easton------------	do.	do.	89	400	489
Fairfield---------	do.	do.	97	747	844
Do----------------	do.	*Campoplex* sp.	19	19	38
Hamden------------	do.	*Cremastus interruptor*	50	400	450
Massachusetts					
Lee---------------	*Coleophora laricella* Hbn.	*Chrysocharis laricinellae* Ratz.	1,033	1,054	2,087
Do----------------	do.	*Angitia nana*	158	73	231
Do----------------	do.	*Dicladocerus westwoodi* Steph.	180	270	450
New Jersey					
New Vernon--------	*R. buoliana*	*Cremastus interruptor*	484	495	979
Do----------------	do.	*Orgilus obscurator*	183	184	367
New York					
North Castle------	do.	*Cremastus interruptor*	474	496	970
Roslyn, L. I------	do.	do.	495	500	995
Syosset, L. I-----	do.	do.	500	500	1,000
Tupper Lake-------	*C. laricella*	*Chrysocharis laricinellae*	998	1,003	2,001

Practically all females of *Angitia*, *Dicladocerus*, *Cremastus*, and *Orgilus* were mated before liberation. Mating was occasionally observed with the other species.

Recoveries of introduced parasites.--Messrs. Dowden and Berry report the recovery of the following introduced parasites: *Bassus pumilus* Ratz., parasite of *Coleophora laricella*, was recovered for the first time in this country at Sydney, Maine, Berlin, N. H., and Saranac, N. Y. It was liberated at Sydney in 1933 and at the other two points in 1934. *Tetrastichus turionum* Htg., parasite of *Rhyacionia buoliana*, was recovered at New Vernon, N. J., and Forest Hills, Mass. *Orgilus obscurator*, also a parasite of *R. buoliana*, was recovered at North Castle, N. Y. Mr. Berry reports that from 24 adult *Ephialtes examinator* Fab., which successfully hibernated last winter, 3,764 adults have been reared in the laboratory from *Cacoecia cerasivorana* Fitch.

Gypsy moth studies.--W. L. Baker, New Haven, reports on the results of a survey of gypsy moth infestations in the town of Petersham, Mass. This survey was made cooperatively with A. C. Cline, Assistant Director of the Harvard Forest. Mr. Baker says: "In 1935 there was a total of 82 completely defoliated areas ranging in size from 0.25 acre to 20 acres. In 1936 there was not one completely defoliated area in the town, and but 13 areas in which the defoliation ranged from 50 to 75 percent. These areas ranged in size from 0.25 acre to 7 acres. Twelve of the 13 defoliated stands of 1936 were new locations; that is, in only 1 of the 82 defoliated stands of 1935 was any appreciable feeding noticed in 1936." Mr. Baker further reports on the factors apparently largely responsible for the widespread reduction in intensity of gypsy moth infestation in certain parts of New England. In northern and western New England there was a rather low percentage of hatch of the eggs deposited both below and above the snow line. In 1936 the "wilt" disease was very noticeable about 2 weeks earlier than in 1935. In 1936 this disease was very prevalent in light infestation, and in certain areas of central Massachusetts and south-central New Hampshire mortality ranging from 95 to 100 percent was observed. The greatest amount of control in 1936 probably resulted from killing frosts which occurred principally throughout western and northern New England about May 25. In some instances oak foliage was completely killed, eliminating the supply of favored food for the small larvae for a period of from 1 to 2 weeks and causing tremendous mortality through starvation. The development of the surviving larvae was not as closely synchronized with foliage development as in a normal season.

PLANT DISEASE CONTROL

Barberry-eradication project.--As a result of rust surveys made since June 1 the physiologic forms present in approximately 150 collections have been identified, and 250 more are now in the process of being identified. Because of the extreme hot and dry weather during much of July it was necessary to suspend operations in the greenhouse, as it was impossible to keep grain plants in a condition suitable for making identifications. In connection with other observations made to determine the extent of migration of rust from south to north and the development of rust near barberries, approximately 515 microscope slides exposed at various places within the Mississippi River Valley have been partially examined but final conclusions cannot yet be drawn. It is estimated, however, that there were far fewer spores in the air this year than in 1935 and probably fewer than in the average season. In the course of rust surveys this summer, records have been obtained of approximately 100 local epidemics of stem rust. It is probable that if the weather had not been so hot and dry many destructive epidemics would have developed near barberry bushes, not only in the Mississippi River Valley but as far east as Virginia and Pennsylvania. The development of rust, however, was checked by extreme high temperatures, lack of precipitation, and low atmospheric humidity.

Work in Michigan.--Since April 1 an average of more than 400 men have been employed in connection with the survey for barberry bushes in Michigan. During the period April 1 to August 1, a detailed inspection was made of more than 5,000 square miles and work has been completed in Huron, Sanilac, Wayne, Livingston, Gratiot, Clinton, St. Joseph, and Ingham Counties. The July report for Michigan shows that nearly 100,000 bushes and seedlings were eradicated during the month from 239 properties.

Work in Illinois.--As a result of 1 year of work with funds appropriated under the Emergency Relief Appropriation Act of 1935, more than 8,000 common barberry bushes have been destroyed in 17 counties in Illinois. More than 600 men have been given from 1 to several months employment during the year.

COTTON INSECT INVESTIGATIONS

Pink bollworm studies in the Laguna district of Mexico.--C. S. Rude, Tlahualilo, Durango, Mexico, reports that during May the greatest emergence from the hibernation tests occurred from both bolls and cocoons that were buried on December 10 and irrigated immediately. The second highest emergence occurred with both groups where the bolls and cocoons were left on the surface and irrigated on December 10. The best results were obtained when the bolls and cocoons were left on the soil surface until March 1 and then buried and irrigated, there being no emergence of moths in the tests with this treatment. (The results in the hibernation tests in Mexico vary from those obtained in the Big Bend of Texas where light emergence occurs from bolls buried and irrigated in December. This difference is probably due to the variations in soil moisture. The soil where the tests were made in Mexico was very dry and the irrigation only added sufficient moisture to make conditions favorable, whereas in Texas the soils contained more moisture and the irrigation was detrimental to survival of the worms.) Infestation counts made during May in several fields where the cotton was small and had not begun to fruit heavily showed no pink bollworms. In a number of fields in other localities the infestation was from 2 to 4 percent. However, in one region near San Pedro three fields were found where the infestation was between 70 and 80 percent in squares and blooms. A survey of this region revealed that a 900-acre field, adjoining the heavily infested fields, was in cotton last year and was heavily infested. The stalks were not cut until late and a great many infested bolls fell to the ground and were not cleaned up. The field was not plowed. This improperly cleaned field was probably the source of this season's heavy infestation. Specimens of two native parasites, Microbracon platynotae (Cush.) and Perisierola cellularis var. punctaticeps (Kieffer) were collected in one of the fields near San Pedro where the pink bollworm infestation was between 70 and 80 percent.

Breeding and shipping the pink bollworm egg parasite Chelonus blackburni.--L. W. Noble and W. T. Hunt have continued to rear at Presidio, Tex., the egg parasite Chelonus blackburni Cameron, which was obtained from Hawaii by the Division of Foreign Parasite Introduction. From a start of one male and four females that reached Presidio alive on June 16, 1935, many thousands of these parasites have been reared and distributed to the pink bollworm infested cotton fields of Puerto Rico and Mexico, as well as in the vicinity of Presidio. These parasites were reared successfully through the winter and spring on the Mediterranean flour moth (Ephestia kuehniella Zell.). After about May 1 most of the eggs failed to hatch. This sterility was apparently due to high temperatures that began the last of April. The daily maximum temperature for that week ranged from 100° to 102° F. and the moths were being reared in a room where the temperature fluctuated. The same trouble occurred in an underground room where the average temperature was 83°, the maximum not over 85°, and the relative humidity, 70 percent. Although the extremely high temperatures were eliminated in this room, the average temperature was rather high and the nearly constant temperature and humidity may have caused this sterility. A Mexican official, visiting the Presidio laboratory, took a stock of parasites with him on his return to the Mexican pink bollworm laboratory at Torreon, Coahuila, on May 2. Approximately 2,000 parasite larvae with the Ephestia host were supplied. These parasites are being propagated in Mexico for release in the Laguna district. A colony of 5,000 adults was released in the Presidio Valley on May 18. No pink bollworm eggs were available then, but on wild plants growing along an irrigation ditch at the point of liberation several species of Coleoptera and Lepidoptera were feeding. Thus far none of the parasites have been recovered from these other possible host insects. Between June 2 and June 11 after cotton had started to bloom and pink bollworm infestations were noted approximately 10,000 adults were released in cotton fields. These liberations will be supplemented by later releases, but this was prevented during the latter part of June because of the difficulties in breeding the parasites already discussed.

Pink bollworm parasite, Elasmus platyedrae Ferr. died out at Presidio laboratory.--In May 1935 the Division of Foreign Parasite Introduction shipped a supply of E. platyedrae from Egypt to Presidio, Tex. No effort was made to colonize this species in 1935, as all available space and personnel were needed for work that had been planned with other species. A small supply was maintained for breeding stock with the idea of colonizing this species in 1936. No particular trouble was experienced in keeping the stock, but it was observed that the parasites did not increase rapidly in number. In case of host decay, the larvae would die when transferred to fresh hosts. During the latter part of March the supply of pink bollworms for use as hosts became heavily infested with mites, and consequently the breeding room and cages also. Fumigation of the room and cages, together with other sanitary precautions and destruction of mite-infested hosts, resulted successfully with all the species being reared on these hosts except E. platyedrae. The number of adults of this species decreased steadily until finally the only material left was a number of hosts in cocoons which had been exposed to the parasites and from which no adult parasites ever emerged.

Egg parasites of cotton flea hopper in Texas.--K. P. Ewing, Port Lavaca, Tex., reports that in June H. J. Crawford first observed many minute insects which later proved to be parasites of the cotton flea hopper, emerging from horsemint in small cages. On both croton and horsemint plants, Psallus seriatus Reut. eggs appeared normal, except that they were dark in color. One parasite was removed from a Psallus egg, and later during June 7 were reared by placing small pieces of croton bark, each containing a dark-colored Psallus egg, in separate glass vials. During July these studies were continued and 27 parasites emerged from 27 cotton flea hopper eggs. Many parasitized eggs were examined under a microscope and each contained 1 parasite that practically filled the egg shell. Apparently there is not room for 2 of the parasites to develop in one flea hopper egg. The parasites are the smallest insects observed emerging from croton plants. During July experiments were conducted to determine the amount of parasitization of cotton flea hopper eggs. Thirty-eight collections of croton plants were made from Brazos, Calhoun, Jackson, Matagorda, Nueces, Refugio, Robertson, Victoria, and Wharton Counties. Each collection consisted of 10 croton plants, which were stripped of their leaves and placed in an emergence cage (regular boll weevil parasite cage). Some flea hopper egg parasites emerged from collections made in each of these nine counties. From these samples, 902 cotton flea hoppers and 957 parasites emerged in July. From the first 10 collections made near Port Lavaca before July 14, 364 flea hoppers and 753 parasites emerged, showing that 67.4 percent of the flea hopper eggs were parasitized. However, during the first 2 days, 191 parasites and 25 flea hoppers emerged, showing that 88.4 percent of the flea hopper eggs were parasitized, which is thought to approximate field conditions this year. A. B. Gahan determined 54 of the specimens submitted as Erythmelus n. sp. and 3 as Anaphes anomocerus Gir.

Cotton-variety studies for boll weevil resistant characters.--Last season E. W. Dunnam and assistants at Stoneville, Miss., studied the varietal differences affecting boll weevil damage to cotton. A large number of varieties having different boll characteristics were planted in single row blocks at five localities in Mississippi and two localities in Louisiana. Dated tags were placed on freshly opened blooms each morning throughout the season. About the time the first tagged bolls began to open, collections of green bolls were made at five localities, regardless of age of bolls, and preserved in a solution of zinc sulphate for laboratory study. In two places a second collection of bolls was made about 10 days later. In two places all bolls were allowed to remain on the plants until they were mature and the cotton opened. A study of the green bolls showed that the weevil damage was invariably greater for those with thin carpel walls. A typical example was the results of a collection of bolls made at Raymond, Miss., on September 7. For 25 varieties bearing bolls with thin carpel walls, the number of boll weevils in all stages per lock was 0.090, while for 6 varieties bearing bolls with thick carpel walls, the boll weevils in all stages per lock were 0.071. In one locality where all the tagged bolls were allowed to mature on 40 varieties, it was found that the boll weevil damaged locks varied from 2.2 to 18.6 percent, and the destroyed locks ranged from 3.4 to 16.9 percent. The lightest percentages of damaged and destroyed cotton were found among the varieties bearing bolls with thick walls. In this study it was also found that weevil egg deposition in green cotton bolls was over a very short period, usually at the time when squares became scarce. In a series of green bolls from 24 varieties collected at Natchez, Miss., on August 5 and August 16, it was found that the average damage per lock was 3.4 times as great in the second collection as in the first collection, made 11 days earlier.

Field cricket controlled by poisoned-bran mash in cotton fields in Mexico.--C. S. Rude, Tlahualilo, Durango, Mexico, reported as follows on April 14: "Crickets continued to be a serious pest in the cotton fields. In some places the cotton is recovering from the cricket damage, but in others, replanting will be necessary. This is a serious situation, as there is not enough seed in the Laguna for replanting." On April 27, Mr. Rude reported that in a few cases a poisoned-bran mash made according to the Kansas formula for grasshopper control, in which white arsenic and wheat bran were used, gave fair results. He found that white arsenic was more effective than calcium arsenate, when used in the bran mash against crickets. Mr. Rude sent in eight adult crickets, which were determined by A. B. Gurney as Gryllus assimilis (Fab.).

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

New pink bollworm infestation.--A new pink bollworm infestation has just been located in the lower Rio Grande Valley on both the Texas and Mexican sides of the river. On August 5 an inspector left San Antonio with a gin-trash machine for Matamoros, Mexico. This place is located just across the river from Brownsville, Tex., and there are eight gins in Matamoros and vicinity. Inspection of gin trash was begun on August 6, and pink bollworms were found in the first sample inspected. Work was continued at that point during the remainder of the week, by which time specimens had been found in trash at all but one of the gins. A total of 113 specimens have been found in the 46 bushels of trash inspected. Infestation has also been located at Reynosa, about 60 miles up the river from Matamoros. It is estimated that approximately 40,000 bales of cotton will be produced in the Matamoros area this season. Immediately after the above finding, additional gin-trash machines were sent to the valley to begin inspection on the Texas side. During the first 2 days' work specimens were found at gins in Brownsville and San Benito. The cotton area on the Texas side is about 125 miles long and perhaps an average of 25 miles in width. It is located in four different counties, and it is estimated that about 70,000 bales will be produced this season. These findings are a further indication of the value and efficiency of gin-trash machines in our inspection work. It is expected that this large cotton area will have been covered very thoroughly within the next week or 10 days. On the Texas side six large and one small machines are in operation, while on the Mexican side a large and a small machine are being operated.

Trap-plot cotton in the Big Bend.--The trap-plot work in the Big Bend district of Texas was brought to a close on July 30. This season 10 plots were used, and they began blooming the latter part of May. A rather large number of worms were trapped up until about June 20, after which there was a considerable decrease. In spite of the fact that cool weather considerably retarded the plot cotton in the early spring, it is believed that a great deal of good was accomplished. Infestation is showing up in the field cotton and, with one or two exceptions, indications at this time are that there is not a great deal of difference between the infestations of this year and last. There is one 10-acre field at Castolon, in Brewster County, which was planted considerably before the recommended date of April 15. Many infested blooms were found during June, and as bolls reached sufficient size they also became infested. An inspection on July 9 showed a 70-percent infestation. By the end of the month the cotton was fruiting much heavier and the infestation had dropped to about 50 percent.

Thurberia plant eradication.--The eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona has continued to make good progress. Practically all of the plants are infested with Thurberia weevil, and they are being eradicated with W. P. A. funds to remove this menace from cultivated cotton. During July 6,720 acres were covered, from which 105,922 Thurberia plants were destroyed. Most of the work in July was along the western slopes of the range, some 20 miles north of Tucson.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Dichlorethyl ether toxic to wireworm larvae.--In recent experiments by M. W. Stone, of the Alhambra, Calif., laboratory, against the sugar beet wireworm (Limonius californicus Mann.), it was shown that a dilute solution of dichlorethyl ether, ranging from 5 to 10 cc per gallon, was highly toxic to the larvae of L. californicus when drilled into infested bean rows planted as a trap crop. The cost of this treatment is estimated to range from $1.70 to $3.70 per acre. When applied at a dilution of 5 cc of dichlorethyl ether per gallon, 96.6 percent of the wireworms were killed.

Relation between cropping system and infestation by bean pod borer in Puerto Rico.--Field observations in the northeastern shore districts of Puerto Rico by L. B. Scott, of the Mayaguez, P. R., laboratory, indicate that the bean pod borer (Maruca testulalis Geyer) is more numerous in beans when this crop is interplanted with corn than when grown in pure stands. It appears that the shade afforded by the corn exerts some influence in inducing a concentration of M. testulalis adults. Other fields of the same variety of beans grown under directly comparable conditions, but not interplanted with corn or other companion crops, were found to be practically free from infestation.

Soil-surface applications of sulphur failed to prevent oviposition of wireworm adults.--Reporting on experiments directed against the adults of the sugar beet wireworm (Limonius californicus Mann.) and the Pacific coast wireworm (Limonius canus Lec.), R. S. Lehman, of the Walla Walla, Wash., laboratory, states that soil surface application of sulphur at rates of 400 and 800 pounds per acre did not have any appreciable effectiveness in preventing oviposition by the adults of these two species.

Effect of gladiolus thrips feeding on corms in storage.--To determine further data on whether the gladiolus thrips (Taeniothrips simplex Morrison) causes a shrinkage in the weight of corms and affects the future growth of the plants, size No. 2 corms of four varieties--Brilliant, Crimson Glow, Alice Tiplady, and Joe Coleman--were used in tests performed by R. H. Nelson, of the Beltsville, Md., laboratory. A total of 480 corms of each variety were selected and divided into 16 lots of 30 corms each; 8 lots were treated with naphthalene, and thrips were added to the other 8 lots. One-half of the collection (4 naphthalene-treated and 4 thrips-infested lots of each variety) were stored in a cool place at from 55° to 65° F., and the other half were placed in warm storage at from 75° to 80°. The naphthalene was removed at the end of 1 month. The average unit weight, that is, the average weight per corm, was taken at the beginning of the test and the same weights after 4 months. Taking the percentage unit loss per corm as a criterion, it is evident that in every case the thrips-infested corms lost more weight than those treated with naphthalene. This was true of the lots stored under either of the given temperatures. The greatest difference in weight was in the variety Alice Tiplady, where the thrips-infested corms lost 10.3 percent more weight in warm storage than did the naphthalene-treated lots.

Calcium arsenate proves toxic to sweetpotato leaf beetle.--L. W. Brannon, of the Norfolk, Va., laboratory, reports that field-cage toxicity tests performed against Typophorus viridicyaneus Crotch showed that undiluted calcium arsenate was highly toxic to the adults. This confirmed results of tests performed in 1923. Cryolite-talc dust (60-40) was more toxic to T. viridicyaneus adults than were derris or cube root mixtures containing 0.5 percent rotenone or derris root sprays containing 0.02 percent rotenone.

Erabu lilies tolerant to thermal treatments against bulb mite.--Reporting on tests with various thermal treatments directed against Rhizoglyphus hyacinthi Boisd. on the bulbs of Erabu lilies (Lilium giganteum Wallich), Randall Latta, of the Sumner, Wash., laboratory, says that the mites were controlled and that none of the treatments had an adverse effect on the crop of flowers. Northern-and southern-grown bulbs were used in these tests. Treatments were as follows: Hot water, for 30 and 60 minutes, respectively, at 110° F., and for 10 minutes at 120°; hot water and formalin (1-200) for 30 minutes at 110°; and vapor heat for 60 minutes at 110°. In addition, the southern-grown bulbs were subjected to vapor heat for 20 minutes at 120°. A retardation of from 2 to 3 days was evident in the blooming of the plants included in the two vapor-heat treatments of the southern bulbs and a retardation of from 3 to 4 days in the blooming of the southern bulbs treated with hot water and formalin.

Rotenone and organic thiocyanate sprays control thrips on greenhouse-grown cucumbers.--C. A. Weigel and R. H. Nelson, of the Beltsville, Md., laboratory, report that sprays containing 0.0056 percent rotenone and pyrethrum extract (1-10,000) with sulphonated castor oil added (1-300) as a spreader, and organic thiocyanate sprays diluted 1-300 were effective in killing adults and nymphs of Thrips tabaci Lind., without injury to the treated cucumber plants in the greenhouse. These sprays were applied at 300 pounds pressure by a specially devised greenhouse power sprayer. The addition of pyrethrum extract to either the derris or cube powder sprays was found to enhance their efficiency against the thrips. An immediate effect was evident against both the adults and the nymphs. The cube powder, plus the sulphonated castor oil, was not as effective as a derris powder spray, even though the rotenone content (0.0056 percent) of both was the same. One of the commercial organic thiocyanate sprays included in these tests was more effective when diluted at 1-300 without the addition of sulphonated castor oil, than when diluted 1-600, but with the sulphonated castor oil added. The other organic thiocyanate diluted 1-600 with sulphonated castor oil added at the rate of 1-400 gave a good control of 85.7 percent, but caused severe spotting of the foliage. It was also observed that the average population of the thrips per leaf showed a steady increase in the case of the checks, as compared to the population on the untreated plants. Incidentally, it was observed that no mildew appeared in any of the sprayed plots, whereas in the check plots it was consistently present. This may indicate some fungicidal action on the part of the sprays containing rotenone or organic thiocyanates under the conditions of the experiment.

Dust mixtures containing rotenone control turnip aphid.--In a continuation of field tests with insecticides against Rhopalosiphum pseudobrassicae Davis on purple-top globe turnips and Florida broadleaf mustard, P. K.

Harrison, of the Baton Rouge, La., laboratory, reports that a dust mixture containing 1 percent rotenone, with equal parts of tobacco dust and sulphur as diluents, was superior to derris sprays and dust mixtures containing nicotine sulphate. The dust mixture containing rotenone not only gave a satisfactory reduction in the aphid population immediately after treatment but continued to inhibit the increase of aphids for a period of at least 6 days. Derris sprays ranked second in effectiveness against the aphids. A nicotine sulphate dust mixture, containing 3 percent nicotine, was quite effective against the aphids for a short period after application but did not afford adequate protection for as long a period as did the derris dusts or sprays.

Dust mixtures containing rotenone effective against western striped cucumber beetle.--K. B. McKinney, of the Phoenix, Ariz., laboratory, reports that the application of dust mixtures containing 1 percent rotenone, derived from derris or cube, with talc as a diluent, proved effective in controlling Diabrotica trivittata Mann. on cantaloups in the Salt River Valley. Treated plots yielded approximately 1.6 times more fruit than did untreated plots grown under comparable conditions, and the protected plants also produced more fruits earlier in the season, when prices were high.

INSECTS AFFECTING MAN AND ANIMALS

Removal of vegetation reduces effect of materials used as outdoor repellents against mosquitoes.--The following results were obtained by W. V. King, G. H. Bradley, and T. E. McNeel, Orlando, Fla., in preliminary tests to determine the relative efficacy of various materials in repelling mosquitoes under outdoor conditions. All materials were applied as emulsions. Collections were made by hand.

Test area	Reduction in mosquitoes after using--		
	Pyrethrum extract	Pine-tar oil	Citronella
	Percent	Percent	Percent
Uncleared (1/5 acre)-	75 to 94	89	85
Cleared (1/5 acre)---	52	--	39
Cleared (2/5 acre)---	49	17	44

Diking of mangrove swamps for control of mosquito and sand fly breeding.--With the cooperation of J. B. Hull, of the Savannah, Ga., laboratory, the St. Lucie County Anti-Mosquito District of Florida has begun the construction of a dike along the Indian River opposite Fort Pierce. The dike prevents the flooding of the swamp by tides, and rain water is to be removed from the breeding area by means of pumps. On July 31, a total of 3,500 lineal feet of dike had been built and one pump capable of pumping 10,000 gallons of water per minute was being installed. Approximately 100 feet of dike with a base of 22 feet, a top 10 feet wide, and 3½ feet above mean low tide level is being built per day. This is believed to be the first dike built in this country to control mosquito and sand fly breeding in mangrove swamps.

Three hundred-mesh wettable sulphur effective in controlling goat lice.--O. G. Babcock, Sonora, Tex., has found that 300-mesh wettable sulphur used as a dip at the rate of 10 pounds to 100 gallons of water is effective in controlling two species of sucking and three species of biting lice that infest Angora goats. The method of using this material in round dipping vats was recently demonstrated to a large number of west Texas ranchmen in 10 counties. Over 6,000 goats were treated in these demonstrations with very effective results.

Larvicides and repellents for screwworm flies.--A mixture of soluble pine oil and nicotine has been found to be very effective in killing larvae of screw worm and other blowflies infesting the wounds of animals. In preliminary laboratory and field tests on the comparative efficiency of pine-tar oil and bone oil carried out at various field stations of the Division of Insects Affecting Man and Animals for protecting wounds from blowfly attack, it has been shown that the former is as effective in this respect as the latter. Marked interest has been developed in recent months in the use of bone oil for repelling flies and killing larvae. It is higher in cost than pine-tar oil and the available supply is limited; tests show it to possess little larvicidal value; and it cannot be scoured out of wool or mohair by the usual cleaning processes.

FOREIGN PARASITE INTRODUCTION

Parasite importations into Puerto Rico.--In January S. M. Dohanian forwarded colonies of four species of Coccinellidae from Trinidad to Puerto Rico for liberation against the coconut scale. Of these Cryptognatha nodiceps Mshll., Pentillia castanea Muls., and Azya trinitatensis Mshll. have become well established and have spread considerable distances from the points of liberation. K. A. Bartlett reports having collected more than one thousand Pentillia in 2 hours at a point 2 miles from the original liberation site. Late in April and in May Mr. Dohanian collected in Peru and forwarded to Puerto Rico a total of 11,705 adults of Ipobracon rimac Wolc. and 1,713 of Theresia claripalpis v. d. W. These were for colonization against the sugarcane moth borer. They were forwarded by air express and were in transit from 6 to 14 days. The survival was 64.4 and 32.5 percent, respectively. One consignment of each species was also sent to Florida. Several species of bean pod borers are serious pests in Puerto Rico and parasites have recently been forwarded for colonization. Through H. W. Allen, of the Division of Fruit Insect Investigations, a total of 8,729 adults of Macrocentrus ancylivorus Rohw., a very effective parasite of the oriental fruit moth, were shipped during July. These were sent by air express and 95.8 percent reached their destination alive. Laboratory experiments have shown that this parasite reproduces readily upon Maruca testulalis Geyer, Fundella cistipennis Dyar, and Elasmopalpus lignosellus Zell. C. A. Clark, of the corn borer parasite laboratory at Moorestown, N. J., forwarded 3,000 adult flies of Lydella grisescens Rond., of oriental origin, for colonization against the same pests. Of these, 69.1 percent survived the 2-day air journey.

Pea weevil parasites from France.--Several shipments of infested broad beans have been made from France by H. L. Parker. The weevils in these shipments were heavily parasitized by Triaspis thoracicus Curt., which attacks a wide range of seed weevils under field conditions. This material is being reared out under quarantine conditions by C. A. Clark, of the Moorestown, N. J., laboratory, and the parasites will be colonized upon the pea weevil in the Pacific Northwest.

Fruit fly parasites to Hawaii.--On July 24 F. C. Hadden returned to Hawaii after completing his investigations in Malaya and India. Infested fruits were collected in those countries shortly before sailing and the parasites reared out en route. A total of 392, representing five species, were alive upon arrival at Honolulu. A portion of these were immediately colonized and the remainder were utilized for rearing in the insectary.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Eighty-two living larvae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were intercepted at Baltimore on April 20 in eight oranges in stores from South Africa. Six larvae of the bean pod borer (*Maruca testulalis* Geyer) were taken at San Pedro, Calif., on May 14 in string beans in stores from Hawaii. Three adults of the coffee berry borer (*Stephanoderes hampei* Ferr.) arrived at New York on Juhe 12 in coffee in the mail from Java. A living specimen of the cercopid *Clastoptera funesta* Stal was intercepted at Brownsville, Tex., on March 12 on a gardenia in cargo from Mexico. An adult of the chrysomelid *Leptinotarsa undecimlineata* (Stal) was found at New Orleans on March 27 with banana debris in cargo from Nicaragua. Larvae of the weevil *Phacecorynes zamiae* Gyll. arrived at Washington, D. C., on May 21 in the stem of *Encephalartos lehmanni* in the express from South Africa. An adult of this weevil was also taken at the same time in *E. caffra* from South Africa. Specimens of *Anaphothrips orchidii* (Moult.) were intercepted at San Francisco on May 22 on orchids in the mail from the Dominican Republic. A larva of the elaterid *Athous haemorrhoidalis* Fab. arrived at Seattle, Wash., on May 29 in soil around the roots of *Hepatica* sp. in the mail from Sweden. One living and five dead larvae of the pink bollworm (*Pectinophora gossypiella* Saund.) were taken at Philadelphia on May 1 in cottonseed in cargo from Siam. The cotton containing the seed was used as packing about lacquer ware. Larvae of the pyralid *Noctuelia rufofascialis* (Stephens) were found at Roma, Tex., on May 27 in a capsule of *Hibiscus cardiophyllus* in baggage from the vicinity of San Pedro, Mexico. Specimens of the thrips *Frankliniella cephalica* (Crawford) were intercepted at Miami, Fla., on May 4 on a rose in passengers' quarters aboard an airplane from the Bahamas. An adult of the wireworm *Heteroderes rufangulus* var. *meticulosus* Cand. was taken at New York on April 17 on a grape in cargo from Argentina. W. S. Fisher states that this species is closely allied to *laurentii*, which has become established in the Southern States. The habits of this species are probably similar to those of *laurentii* and it might become a pest if established in the United States.

Pathological interceptions of interest.--*Camarosporium* sp., no species reported on orchids, was intercepted at San Francisco February 5 on *Oncidium* sp. from Honduras; *Cephalosporium pammelii* var. *purpurascens* Buchanan was intercepted at Baltimore July 24 on apples from Japan; a jasmine leaf intercepted July 16 at Brownsville was infected with a *Cercospora* producing definite spots similar to those of *C. rosicola* Pass. on rose leaves; *Colletotrichum erumpens* Sacc. (first interception) was fruiting abundantly on cankers on rhubarb from Sweden intercepted July 31 at Norfolk; *C. macrosporum* Sacc., first interception, was found on *Phalaenopsis schilleriana* from the Philippines intercepted November 14, 1935, at San Francisco; a fungus nearer *C. lujae* Verpl. and Claess. than any other named species but with smaller spores was found on *Lycaste* sp. leaves from Dominican Republic on February 24 at San Francisco; *C. nigrum* was intercepted from Panama on peppers for the first time on July 27 at New Orleans; *C. phomoides*, first interception on tomato from Brazil, was taken July 13 at New Orleans; *Colletotrichum* sp., does not agree with species reported on *Oncidium*, was intercepted on *O. unguiculatum* from Mexico on February 11 at San Francisco; *Coniothyrium* sp., not either of species described on orchids, was intercepted on *Oncidium* sp. from Honduras on February 5 at San Francisco; *Diplodina salicis* West. was intercepted from Germany for the first time on June 12 at New York; a trace of what appeared to be *Discella strobilina* (Desm.) Died. was found on *Picea rubra* cones from Nova Scotia intercepted at New York July 20, only previous interception from Poland; *Gloeosporium affini* Sacc. was intercepted at San Francisco on January 20 on *Cattleya mossiae* from Venezuela and on March 5 on *C. dowiana* and *C. skinneri* from Costa Rica, the only previous interception was from Tobago Island; *G. intermedium* var. *epidendri* Sacc., first interception, was taken on February 24 at San Francisco on *Epidendrum* sp. from Dominican Republic; *G. oncidii* Oud., first interception since 1923, was found at San Francisco on March 5 on *Oncidium stenotes* from Costa Rica; our first interceptions of *Heterosporium allii* Ellis and Mart. on onion were made at New York on July 8 on onions from France and on July 28 on onions from Chile; *Macrophoma oncidii* Henn., first interception, was found on December 27, 1935, at San Francisco on *Cattleya dowiana* from Costa Rica; *Melampsora pinitorqua* Rostr., first interception, was taken at New York on July 6 on *Pinus montana mughus* from Germany; *Mollisia* sp., no species described on orchids, was found on 25 percent of the dead flower stalks of a group of orchids from Guatemala reaching San Francisco in baggage; *Nectria binotiana* Sacc., first interception, was found on January 21 at San Francisco in *Cattleya mossiae* from Venezuela and *Ophiobolus* sp., no species reported on orchids, was found on a similar shipment of the host on the same boat on January 20; *Pestalozzia* sp., not agreeing with any species reported on orchids, was found on November 13, 1935, at San Francisco on orchids from Guatemala, and on December 9 another one on *Cymbidium* sp. from Japan and *Phomopsis* sp., unlike only species reported on orchids and *Phyllosticta stanhopea* All., first interception, were found on orchids from Guatemala; *Physalospora orchidearum* P. Henn., first interception, was found on *Lycaste* sp. from Dominican Republic on February 24 at San Francisco; *Pleospora neottiae* Hollos., first interceptions, was found on orchids from Guatemala on November 14, 1935, and Mexico on February 11; *Sphaceloma perseae* has been found to be more or less prevalent on many shipments of Cuban avocados at New York beginning the middle of July; *Uredo rochiae* Putt., first interception, was taken at Washington on May 4 on *Myrciaria cauliflora* from Brazil; *Uredo* sp., apparently undescribed, was found at San Francisco on July 16 on *Oncidium bicallosum* from Mexico.

Linguistic ability helps inspector.--A New York inspector heard the steward accompanying him asked, "Hae el encontrarse los mangoes?" He finally found the mangoes, 18 of them from Cuba, hidden among some apples in an an American apple box. Inspectors who know foreign languages are likely to get such tips if their linguistic ability isn't known to the would-be smugglers.

No need for Sherlock Holmes.--Glimpsing a safety pin about half way up the sleeve of a light-weight coat slung over the arm of a passenger a New York inspector found that four iris roots, with soil, from Japan had been pinned up the sleeve in a small oiled-paper package.

Fruit fly in personal effects.--On May 21 a living fruit fly larva (Ceratitis sp.) was intercepted at New York in the bottom of a suitcase, among personal effects, in which a passenger had four grapefruit from Palestine. Two out of the four grapefruit were found infested with Ceratitis sp., one with one larva and one with four larvae.

Fruit fly pupating in box with uninfested fruit.--On May 25 a half box of blood oranges arrived at New York in stores from Spain. All the oranges were examined for fruit fly larvae, many being cut up, with negative results. Although no larvae were found in the fruit, three living puparia of the Mediterranean fruit fly (Ceratitis capitata Wied.) were located on the boards at the bottom of the box. No signs of old infestation were found in the fruit.

Interesting pest in orchid.--A living larva of the castniid Castnia sp. was intercepted at Washington, D. C., on May 9, 1936, in a pseudo-bulb of a wild orchid (Cattleya sp.) in express from Venezuela. Another living specimen of this lepidoterous larva was taken at Washington, D. C., on July 17, 1935, in a pseudo-bulb of an orchid in express from Brazil. A living specimen of the giant sugarcane borer (Castnia licus Drury) arrived at Honolulu, Hawaii, on April 12, 1935, in a corm of Heliconia angustifolia from the Canal Zone. The adult moth was reared. The giant sugarcane borer is recorded as a major pest of sugarcane in Trinidad, British Guiana, and other parts of South America. C. licus Drury was recorded in 1905 in the roots of an orchid in the upper Orinoco. Other hosts include another species of Heliconia (H. bihai), banana, plantain, young coconut palms, another palm, Oreodoxa oleracea, and one species of grass. The wing spread of the adult moth is about 4 inches. Fully grown larvae (and also adult moths) vary considerably in size. When fed on large succulent cane, the larvae may measure as much as 4 inches in length and one-half inch in diameter in front, but specimens half this size are encountered. It was not possible to determine the species of Castnia taken recently with orchids from Brazil and Venezuela, as the larvae of this group are not sufficiently known.

DOMESTIC PLANT QUARANTINES

Citrus canker found in marshland of Louisiana.--The recent finding of citrus canker in the marsh section of Louisiana is a true indication of the value of the autogiro in locating isolated citrus growth. The canker was discovered on an island 5 miles farther than the inspector was able to navigate with a boat. Had not the autogiro been available for survey purposes in the almost inaccessible swamp areas, the infection would no doubt have existed indefinitely. The autogiro was loaned by the leader of the Dutch elm disease project. W. E. Anderson, in charge of citrus canker eradication in Louisiana, writes: "The survey work of the marshlands of Louisiana to locate isolated citrus plantings by the use of the United States Department of Agriculture giroplane is directly responsible for the finding of this infection."

Date palm scale quarantines revoked.--Federal domestic plant quarantine No. 6, pertaining to the date palm scale, was revoked effective July 1, 1936, and the State of California has announced the revocation of their intrastate quarantine covering this pest. The Federal quarantine had been issued to prevent the interstate spread of the scale insects attacking dates and it prohibited the movement of date palms and date palm offshoots from certain parts of California, Arizona, and Texas. The revocations are based on the fact that the date palm scale has apparently been eradicated from the United States.

Freight cars inspected for Japanese beetle.--During this season of the year when the Japanese beetle is in flight, transit inspectors have inspected freight cars destined to or reconsigned from Chicago, Cincinnati, Kansas City, Milwaukee, and St. Paul, which contained fruits and vegetables consigned from the area regulated by the Japanese beetle quarantine. Fifty-five live and 278 dead beetles were found during the period from June 27 to August 1.

Nurseries receive permits for shipping five-leafed pine interstate.--Fifty-seven applications for permits to ship five-leafed pines interstate under the regulations of the white pine blister rust quarantine were received during the fiscal year 1936. This is an increase of 16 percent over last year, probably owing to the fact that the demand for five-leafed pines has been greatly stimulated, primarily because of recognition by the public of the value of this tree in reclaiming denuded areas, in protecting water sheds, and in preventing soil erosion. Of the 57 applications received, 20 commercial nurseries and 8 Federal and State nurseries received permits for the shipping of approximately 27,000,000 five-leafed pines, tentative permits were issued to 12 nurseries in which the pines had not reached a salable size, action is pending in 14 cases, 2 applications were withdrawn, and 1 was denied.

CONTROL INVESTIGATIONS

Fumigation of seed kills vetch bruchid.--In a series of experiments completed last month at Salisbury, N. C., A. C. Johnson, in cooperation with J. S. Pinckney, of the Division of Cereal and Forage Crop Insect Investigations, worked out a treatment for the fumigation of vetch seed to kill the vetch weevil (Bruchus brachialis Fahr.). In this work it was found that the weevils could be killed by fumigation of vetch seed under reduced pressures with a dosage of 7 ounces of hydrocyanic acid per 100 cubic feet of space, including the space occupied by the vetch seed. The atmospheric fumigation of hydrocyanic acid was also effective. With a dosage of 3 pounds of hydrocyanic acid per 1,000 cubic feet of space and a 24-hour exposure a complete kill was obtained. A complete kill was also obtained when the seed was fumigated with carbon disulphide at a dosage of 20 pounds per 1,000 cubic feet.

Effects of nicotine on hearts of cockroach and armyworm.--J. F. Yeager and J. B. Gahan recently submitted a paper for publication on "Effects of rhythmicities of isolated heart preparations from cockroach (Periplaneta americana L.) and southern armyworm (Xylomyges eridania Cram.)", in which they compare the effect of nicotine on the hearts of adult roaches with the effect on the hearts of larvae of the southern armyworm. They find the roach heart much more susceptible to nicotine than that of the southern armyworm and suggest that this might be due to the presence of ganglionic cells in the roach heart which apparently did not occur in the heart of the southern armyworm larva. Nicotine preparations containing 10 percent nicotine were employed. The work was a careful piece of physiological work and adds to our knowledge of the effect of nicotine on insects.

Enzymes secreted by southern armyworm.--In recent work on the digestion in the southern armyworm, Babers and Woke have found that nine enzymes were secreted in the digestion, all of which were found in the tissues of the midgut. It is of interest to note that only two were found in the tissue of the foregut and two in the tissue of the reargut. The midgut apparently is the most important digestive organ of the larva of this insect.

INSECTICIDE INVESTIGATIONS

Cryolite spray residues removed by new washing solutions.--In the search for substitutes for lead arsenate, much attention has been given to certain compounds of fluorine, especially barium fluosilicate and cryolite. These compounds have been found to be effective for controlling several species of insects. Their use as insecticides is greatly restricted, however, because when sprayed or dusted on fruits or vegetables a fluorine-containing residue is left, which is deleterious to health. The Department of Agriculture has established a tolerance for fluorine residues on fruits of 0.01 grain F per pound. This is the same tolerance as that for arsenic. This means that apples, for example, that have been sprayed with cryolite for the control of the codling moth must be washed before they enter interstate commerce. Cryolite is not as easily removed from apples by the ordinary washing solutions as is lead arsenate. For this reason, it has been difficult for orchardists spraying with cryolite to meet the tolerance for fluorine on the fruit. An investigation of the solubility of cryolite in various reagents was undertaken to aid in developing more efficient washing solvents. It was found that three common materials, boric acid, aluminum salts, such as the sulphate and chloride, and ferric salts, such as the sulphate and chloride, when added to dilute hydrochloric or sulphuric acid, markedly increase the solvent action of these acids on cryolite. Public-service patents covering the use of these materials for the removal of fluorine insecticide residues from fruits and vegetables have been granted recently to members of the Division of Insecticide Investigations. United States patents 2046546 and 2046547 were issued to R. H. Carter and 2046548 to R. H. Carter and J. E. Fahey. It is hoped that the use of these solvents will enable the orchardist to remove fluorine spray residues from apples more effectively and may therefore lead to the greater use of the valuable fluorine-containing insecticides.

No pyrethrins in daisy flowers.--Because of their close resemblance to pyrethrum flowers, common field daisies (Chrysanthemum leucanthemum) have been used to adulterate pyrethrum. Morever, the oleoresin of the field daisy when analyzed by the method of Seil for pyrethrin I and the method of Haller and Acree for pyrethrin II apparently contains about 5 percent of each of these pyrethrins. Although inert insecticidally, field-daisy extract thus appears to contain the active principles of pyrethrum flowers when analyzed by the methods commonly used by the industry. A chemical examination of daisy flowers to see if they contain pyrethrins or chemically related constituents has been made by F. Acree, Jr., and F. B. LaForge, of the Division of Insecticide Investigations. They report (Soap, vol. 12, no. 8, p. 109, 111. Aug. 1936) that the oleoresin of C. leucanthemum contains no pyrethrins or any other material closely related to the pyrethrins.

BEE CULTURE

Upon invitation of the Bureau, a conference was held at Ames, Iowa, on July 20, to discuss methods and policies for conducting an investigation of the resistance of honeybees to American foulbrood. Such an investigation was authorized by the last session of Congress through an appropriation of $7,500 to the Division of Bee Culture. Through the courtesy of the Iowa Agricultural Experiment Station a conference room and other facilities were provided. Officials of the Bureau and representatives of the Agricultural Experiment Stations of Iowa, Wisconsin, and Wyoming were in attendance. The Agricultural Experiment Station of Texas, which has signified its willingness to cooperate, was not represented. The Iowa Agricultural Experiment Station was represented by W. H. Stevenson, vice director, C. J. Drake, in charge of the Department of Zoology and Entomology, F. B. Paddock, and O. W. Park. The American Bee Journal, already cooperating with the Iowa Experiment Station on a similar project, was represented by H. C. Dadant, Roy A. Grout, and Frank C. Pellett. W. J. Maytham was present as a delegate from the Iowa State Beekeepers' Association. The Wisconsin Agricultural Experiment Station was represented by L. J. Cole, chairman of the Department of Genetics, and H. F. Wilson, chairman of the Department of Economic Entomology. The Wyoming Agricultural Experiment Station's representative was C. H. Gilbert, associate research apiculturist. There were present from the Bureau, Jas. I. Hambleton and W. J. Nolan, Beltsville, Md., C. L. Farrar and A. P. Sturtevant, Laramie, Wyo., Otto Mackensen, Baton Rouge, La., and Harry Laidlaw, Madison, Wis. M. P. Jones, extension specialist, Washington, D. C., also attended. The tentative plans include a search in this country and abroad for bee stock having a history of resistance to American foulbrood, the testing of such stock under experimental conditions to determine whether it does possess resistance, then breeding to perpetuate the resistance and to incorporate other desirable characteristics. General supervision of the entire project will be centered in the Division of Bee Culture and specialized phases of the work will be taken care of by the cooperating agencies. Thus Iowa and Wyoming will assume the task of subjecting stock undergoing tests to standardized doses of infection to determine definitely whether it has resistance. Those in charge for Iowa will be O. W. Park and F. B. Paddock. C. H. Gilbert will be in charge for Wyoming, where studies will also be made of the tendency of various strains and races to become infected naturally, as opposed to artificial inoculation. Texas, under the leadership of H. B. Parks, will rear in quantity for further testing queens from stock that appears to possess favorable characteristics. Records of all queens will clear through the Wisconsin Agricultural

Experiment Station and Messrs. Cole and Wilson will serve as consultants on breeding activities. Harry Laidlaw, working at the University of Wisconsin, will devote his time primarily to the perfection of methods for controlling matings. A. P. Sturtevant, of the Laramie, Wyo., laboratory, will have charge of the various bacteriological phases, including a study of differences in the virility of possible strains of Bacillus larvae White. The facilities of the Division's laboratories at Beltsville, Md., Baton Rouge, La., and Davis, Calif., will also be employed in various phases of the work. It is hoped that the services of State apiary inspectors will be available in locating colonies showing disease-resistance characteristics. It is also hoped that individuals owning colonies believed to possess disease resistance will communicate with their State apiary inspector or with any of the cooperating agencies. The fact that investigations of this type will have to be carried on over a period of years was repeatedly emphasized during the conference. All in attendance fully recognized that immediate results could not be expected and that it will not be possible soon to distribute stock for breeding purposes. Those in attendance recognized the importance of not arousing undue hopes that the development of resistant strains would eliminate the necessity of continuing present methods for combating American foulbrood. To insure that the results of the studies would not convey an erroneous impression, they reached an agreement on a method of making public the results obtained as the investigations progress.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Weevil, new to North America, attacks peanuts.--Two specimens of a weevil identified by L. L. Buchanan as Naupactus leucoloma Boh. were recently received from A. N. Tissot, Agricultural Experiment Station, Gainesville, Fla. The weevils were reported to be injuring peanuts at Crestview, Fla. This species, which has not heretofore been known from North America, was described from Tucuman, Argentina, and has been reported also from Chile, Uruguay, and New South Wales. At the last-named locality the larvae were found attacking roots of lucerne (Marshall, R. A. E., v. 21, p. 303, 1933).

Host record for a species of Nertus.--Two specimens determined by Mr. Buchanan as an apparently undescribed species of Nertus were found in cells in a bamboo joint from Mexico by W. R. Sudduth at Naco, Ariz., interception No. 221. This tropical curculionid genus includes only a few species, all of them rare in collections. As far as is known, nothing has been reported heretofore on the host relations.

Another record for Cuterebra baeri Shannon and Greene.--A pupa of this species of botfly was intercepted at New Orleans, La., by the Division of Foreign Plant Quarantines, in banana trash from Mexico on July 15, 1936, under New Orleans No. 19868. The finding of this specimen is interesting because it is only the third record for this species. The first specimens were collected from the throat portion of the howling monkey (Alouatta palliata inconsonans Goldman) at Darien, Panama, in 1924 by the late J. L. Baer. The second record related to material taken at Kartabo, British Guiana, on July 22, 1924, by Alfred Emerson, then of Pittsburgh University, also from a species of howling monkey. When the parasite larva is full grown it leaves the host and falls to the ground to pupate. Although it has the characteristic appearance of Cuterebra, the larva is very distinct from those of all other known species of the genus.

New parasite of hessian fly.--Recently there were submitted for determination four specimens of a chalcidoid parasite recorded by H. D. Smith, of the Bureau's laboratory at Hyeres, France, as having been reared at that laboratory from a puparium of the hessian fly. According to A. B. Gahan, the parasite appears to represent a new genus of Tetrastichinae. We have no record of the previous rearing of any such form from the hessian fly.

Two egg parasites of the cotton flea hopper recorded.--Two species of Mymaridae reared from eggs of the cotton flea hopper (Psallus seriatus Reut.) at Port Lavaca, Tex., by H. J. Crawford, have recently been identified by A. B. Gahan as Erythmelus n. sp. near gracilis (How.) and Anaphes anomocerus Girault. So far as known, no parasites have previously been recorded from this important cotton insect. The new species of Erythmelus appears to be the more abundant parasite of the two, 54 specimens of that species having been sent in for identification while only 3 specimens of Anaphes anomocerus were submitted. Anaphes anomocerus was originally described by Girault from specimens reared at Salt Lake City from eggs of Halticus citri Ashm. on alfalfa, and was treated as a variety of A. iole Girault. Mr. Gahan doubts whether the slight differences which distinguish it from A. iole are even of varietal importance. The typical A. iole is said to be parasitic in eggs of Hypera nigrirostris Fab., and is recorded from Illinois and Virginia. Nothing is known of the distribution of the supposed new species of Erythmelus.

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UNITED STATES DEPARTMENT OF AGRICULTURE

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NEWS LETTER

FOR AUGUST 1936

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J. W. FOLSOM

Justus Watson Folsom, entomologist in the Division of Cotton Insect Investigations, died at the Vicksburg, Miss., infirmary on September 24, after an illness of several weeks following heart attacks.

Dr. Folsom was born at Cambridge, Mass., on September 2, 1871. He received the degree of bachelor of science in 1895 and that of doctor of science in 1899 from Harvard University. For 1 year (1899-1900) he was professor of natural science at Antioch College, Yellow Springs, Ohio. In 1900 he went to the University of Illinois as instructor in entomology. He was associate in entomology from 1906 to 1908 and assistant professor from 1908 to 1923. He came to the Bureau of Entomology in 1925 as associate entomologist. During his entire service in this Bureau he was located at the Tallulah, La., laboratory of the Division of Cotton Insect Investigations.

Dr. Folsom was interested in many phases of entomology and his publications include papers on anatomy, physiology, embryology, and ecology of insects. He had an international reputation as an authority on Collembola and Thysanura and published numerous systematic papers on these groups. Much of his earlier economic work was with alfalfa insects. During recent years his economic studies have been devoted to cotton insects. His text-book, "Entomology with special reference to its ecological aspects", has been widely used during the past 25 years. The fourth revision, published in 1934, was revised by Professor R. A. Wardle, and appeared under the joint authorship of Folsom and Wardle.

Dr. Folsom was a Fellow in the American Association for the Advancement of Science and in the Entomological Society of America. He was president of the latter association during 1931. He was a member of the American Association of Economic Entomologists, serving as vice-president during 1932, being the chairman of the Cotton States branch. He was also a member of the Ecological Society of America and of the Cambridge Entomological Club, serving as president of the latter organization in 1900. Many of the well-known entomologists of the United States were among his students at the University of Illinois.

F. S. STICKNEY

F. S. Stickney, associate entomologist on the staff of the Bureau laboratory at Whittier, Calif., Division of Fruit Insect Investigations, died on August 15, as a result of a heart attack 2 days previously. Mr. Stickney was born at Wilson, N. C., August 6, 1892, His early training was received in North Carolina and Hawaii. He received the degree of B. S. from the University of California in 1916, his M. S. from the University of Illinois in 1918, and his Ph. D. from the same institution in 1921. He also carried on special advanced study at Stanford University. During the World War he served for about a year in the Sanitary Corps. In 1921 Mr. Stickney undertook a study of the Parlatoria and other date scales for the Federal Horticultural Board, in connection with eradication projects in the Coachella Valley. This work was later carried on under the Bureau of Entomology and was broadened into a general study of date insects and mites, a manuscript on which was nearly complete at the time of his death. With the discontinuance of the investigations on date insects and mites, Mr. Stickney was transferred to work on the citrus red scale in California. He had a special interest in the morphology of the Coccidae and in the reactions of insects to different temperatures and humidity. Mr. Stickney's untimely death is a serious loss to the Bureau and to the profession. A widow, Elizabeth Gaylord Stickney, and three children survive.

FRUIT INSECT INVESTIGATIONS

Parasite of woolly apple aphid well distributed in Yakima and Wenatchee Valleys.--E. J. Newcomer, of the Yakima, Wash., laboratory, reports that *Aphelinus mali* Hald. was introduced into the Yakima and Wenatchee Valleys a few years ago for the control of the woolly apple aphid, which is of special importance in connection with the perennial canker disease of apple. In the Wenatchee district *Aphelinus* was found in July 1936 in a small, isolated orchard area about 10 miles from the main orchard section. It was also found in the only commercial orchard between these two areas and in an abandoned orchard between the areas. The country in between is mostly desert. All of these places are along the Columbia River, below Wenatchee. So far as known, no introductions of parasites were made in any of these places, except in the main orchard section. In the Yakima district a rather brief survey of the orchard area within a radius of 20 miles of Yakima in August 1936, indicates that *Aphelinus* is distributed throughout this area. Many orchards examined were several miles from sites of introductions made by this laboratory. Some introductions have been made by growers, but it is evident that the parasite spreads rapidly. In at least two instances, introductions made into one or two trees a year ago have spread over 20 acres or more, and in one locality the parasite is so numerous that material is being obtained for shipment elsewhere. A remarkable example of the ability of this parasite to disperse itself was discovered late in August 1936. Along the highway from Yakima to Hood River there is an isolated apple tree. This tree was examined, and considerable numbers of parasitized woolly aphids were found on it. The tree is at least 10 miles from any commercial orchard, with a range of hills between.

Life history of Blapstinus rufipes Casey.--C. K. Fisher, of the dried-fruit insect laboratory at Fresno, Calif., reports that in the rearing work with B. rufipes the food given adults and larvae was whole kernels of wheat soaked in water until soft. The eggs were laid in a glass dish, the bottom of the dish being covered with blotting paper. Larvae and pupae were held in glass vials in which a moist atmosphere was provided by introducing moistened strips of blotting paper. Five females, confined with five males, produced 230 eggs, of which 76 percent hatched. The incubation period ranged from 3 to 8 days, the larval period from 40 to 45 days (5 records), and the pupal period was 5 days (3 records). The rearings were made in an incubator. The temperature ranged from 80° to 102° F., but was usually about 90°.

Sprays for protection of early ripening tree fruits from Japanese beetle attack.--W. E. Fleming and F. E. Baker, of the Moorestown, N. J., laboratory, state that during the season 12 series of tests, involving 1,320 cages, 264,000 beetles, and 3,600 sprayed plants, were completed and information obtained on approximately 100 spray materials and combinations. These studies were conducted in the laboratory under controlled conditions of temperature, relative humidity and light in special glass cages, as previously described by Fleming and Baker (Jour. Agr. Research 48:115-130; 49:39-44. 1934). They found that Cracca with a rotenone content of 1.7 percent was only about one-fourth as effective as a repellent as derris having a rotenone content of from 4 to 5 percent. Cube and Timbo with a rotenone content and total extractives equivalent to derris were only half as effective as repellents. The impregnation of derris with rosin to increase the resistance of the deposits to removal by water or decomposition by light significantly reduced the value of the derris as a repellent, while the addition to the rosin of a small quantity of cresol, beta naphthol, thymol, quinine, or naphthalene appeared to overcome the detrimental effect of the rosin. The addition of red, orange, yellow, green, blue, violet, and black dyes with the rosin used to impregnate the derris did not modify the repellency of the derris. Impregnation of derris with cumar, coal tar, or gilsonite improved the resistance to removal by water and decomposition by light but completely destroyed the value of the material as a repellent. The impregnation of derris with pine products--pine oil, pine pitch, pine tar, or dipentene--improved the resistance of derris to removal by water and decomposition by light but completely destroyed the value of the material as a repellent. The addition of Bordeaux mixture appeared to decrease the repellency of derris. Sulphur increased the resistance of derris to removal by water and decomposition by light, while sulphur alone had no repellent value. Lime sulphur likewise increased the resistance of derris to removal by water and decomposition by light, although lime sulphur alone, or in combination with aluminum sulphate, copper sulphate, iron sulphate, or zinc sulphate, was neither toxic nor repellent to the beetles, the addition of these materials to derris definitely increased the effectiveness of derris as a repellent and greatly reduced the removal of the repellent substance by water. In connection with studies of different arsenical sprays, they found that two commercial acid lead arsenates, practically identical in chemical composition, differ widely in their insecticidal and repellent values, the "micronized" sample being 1.42 times more effective as an insecticide and reduced the amount of feeding by the beetle to 22 percent of that on the "ordinary" commercial acid lead arsenate. Apparently the size of the arsenical particles is an important factor governing the effectiveness of acid lead arsenate for the Japanese beetle. The addition of ferric oxide to acid lead arsenate sprays to prevent injury to foliage of shade trees reduced the insecticidal value of the arsenical 50 percent, while at the same time the feeding by the beetles on the sprayed foliage increased from 1.50 to 2.74 times, depending upon the amount of ferric oxide present. Basic zinc arsenate proved to have no value as a stomach poison or as a repellent against the beetle.

Development of immature stages retarded during the summer of 1936.--T. N. Dobbins, Moorestown, submits a summary of the relative proportion of the various stages of the Japanese beetle represented in the soil population by 10-day periods during August 1935 and 1936. Earlier results of this work were reported in the News Letter for July 1936 (vol. III, no. 9).

Period	Percentage frequency of--						
	Eggs	Larval instars			Prepupae	Pupae	Adults
		1st	2d	3d			
1935							
August 1-10---	28.4	59.6	11.7	0	0	0	0.2
August 11-20---	11.5	48.9	39.6	0	0	0	0
August 21-31---	1.7	31.5	64.6	2.2	0	0	0
1936							
August 1-10---	43.5	48.2	5.3	1.3	0	0	1.7
August 11-20---	19.7	39.9	40.3	0	0	0	0
August 21-31---	1.7	48.9	46.4	3	0	0	0

MEXICAN FRUIT FLY CONTROL

No Anastrepha ludens trapped.--Field operations on the Mexican fruit fly project were uninterrupted by inclement weather throughout the month of August, except for the last few days. During the last week this area received exceptionally heavy rains which have materially benefited the present fruit crop. Apparently the groves are in better condition at present than at any time within the last few years. Almost nine thousand traps were kept in operation throughout the month without taking any Anastrepha ludens Loew, either in the groves or the brushlands. There were trapped, however, 22 A. serpentina Wied., 2 A. acidusa Walk., and 325 A. pallens Coq. Very few larvae and no adults were taken from the border cities of Matamoros and Reynosa, Mexico.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Migration of Camnula pellucida Scudd.--L. P. Rockwood, Forest Grove, Oreg., reports that a mass migration of C. pellucid was observed on July 26 and 27 in the Upper Klamath Marsh in Klamath County. Grasshoppers were flying in a steady stream from the southeast over ground that was still too wet to traverse, in the central part of the marsh, and were invading five or six sections of good grassland on the western side of the marsh where serious damage had already been done to the marsh grazing (particularly to Juncus) over parts of two or three sections. Bunching was observed on egg beds in the invaded area and there will probably be several large 1936-37 egg beds in this area which in 1935-36 had only a few small scattered beds. C. pellucida from the original egg beds on the invaded area were still mostly in stages 3, 4, and 5, with very few teneral adults, as the hoppers did not begin to hatch here (on ground that was mostly still wet on June 25) until June 12. This was a month later than the beginning of hatching on the drier bench lands on the eastern side of the marsh whence the migrating grasshoppers originated. The only large area of egg beds found on the eastern side of the marsh in 1935-36 was on the eastern side of Little Wocus Bay, 5 miles south-southeast on an air line from the point of observation on the western side. Here egg beds in 1935-36 had been numerous and heavily populated over an area of from 15 to 20 acres. When this area was visited on July 27 it was found that large numbers of C. pellucida were leaving and flying off over the wet land to the northwest. There is no doubt that this egg bed area was the source of the invading swarm that was damaging grasslands on the western side of the marsh 4 or 5 miles away. The migrating individuals of C. pellucida were observed to average considerably larger and were brighter in color, particularly the bright yellow males, than the scattered individuals that originated on the small, widely scattered egg beds on the eastern side of the marsh a few miles north of Little Wocus Bay. The difference in color is probably not sufficient to constitute a migratory phase but strongly suggests an approach to that phenomenon.

Corn injured by white grubs in southern Wisconsin.--According to T. R. Chamberlin and Lee Seaton, Madison, Wis., considerable injury to corn by white grubs has been reported in southern Wisconsin but investigations in Dane, Rock, and Walworth Counties showed this injury to be very spotted and badly injured fields to be relatively scarce. On August 7 and 8, in Rock and Walworth Counties only four of the many fields examined showed conspicuous injury. Digging in damaged fields gave averages of approximately 5 to 8 stage-3 grubs per plant. From the field showing an average of 8 grubs per plant many grubs had already been removed by skunks whose diggings were found at almost every damaged hill. Most of the damaged plants had no growing roots left and had stopped growth at heights of from 1 to 4 feet. It is estimated that 50 percent of this field of approximately 10 acres was ruined by August 8. It was easily separable into approximate halves, one almost totally ruined and the other not or but slightly injured. The ruined portion was planted on land which had been in barley the preceding season, whereas the uninjured portion was on plowed sod land that had contained much alfalfa and clover last season when there was a major flight of the beetles. Doubtless the clover and alfalfa had had a beneficial effect on the soil and aided plant growth, but diggings showed only 2.375 grubs per hill in that part of the field and no skunks had been digging there. These observations agree with those of many previous workers and indicate that beetles do not oviposit heavily in alfalfa and clover. The drought undoubtedly retarded the normal growth of the corn. One tall green plant growing in rich soil and not suffering from lack of moisture showed 17 stage-3 grubs at its base. Part of the roots were eaten away but no effect was yet evident on the plant above ground. Another field of about 40 acres in Walworth County was estimated as being from 30 to 40 percent ruined by grubs. This corn was also planted on land that had been in barley the year before.

Phyllophaga tristis Fab. develops rapidly in the laboratory.--Messrs. Chamberlin and Seaton state that an egg of *P. tristis*, dug in the field on June 11 and incubated in the laboratory, had produced a pupa by August 24, that is to say in the short period of 2 months and 13 days.

Wheat varieties susceptible to hessian fly dominate tests in California.--W. B. Cartwright, Sacramento, Calif., reports that 170 wheat varieties from a field test of 300 at Birds Landing, Calif., were susceptible to hessian fly. This number represents the minimum on which sufficient data are collected to warrant their elimination from further tests.

Strains of wheat resistant to hessian fly and wheat joint worm.--E. T. Jones, Manhattan, Kans., states that analysis of hessian fly infestation and rust-infection data, taken from a large series of spring and winter wheat crosses, has shown lines of F_4-generation winter-habit hybrids of Marquillo x Oro, Kawvale, Minturki, and Tenmarq to be resistant, or segregating for resistance, to stem rust. Some very promising rust-resistant and fly-resistant selections of these wheats have been made for fall planting in cooperation with plant breeders. Infestation records for 145 winter-hardy fly-resistant selections of Marquillo winter wheat hybrids from Springfield, Mo., indicate that a number of strains may be resistant to wheat joint worm. The data of the following table show no correlation to exist between resistance to wheat joint worm and resistance to hessian fly.

Cross (F_4 generation)	Lines examined	Lines infested with *H. tritici*	Plants infested by spring-brood hessian fly: In lines infested by *H. tritici*	Plants infested by spring-brood hessian fly: In lines not infested by *H. tritici*
	Number	Percent	Percent	Percent
(Kan. x Hd. Fed.) x Marquillo	6	33	2.5	2
Minturki x Marquillo	11	46	11.0	30
Marquillo x Oro	16	56	26.0	9
Marquillo x Minturki	50	70	44.0	32
Kawvale x Marquillo	28	71	23.0	27
Marquillo x Tenmarq	35	97	22.0	0

Contrasting infestations in wheat varieties to joint worm in 1936 tests.--W. B. Cartwright also reports that in a series of 300 varieties grown at Birds Landing, a more perfect synchronization of the joint worm oviposition period with the wheat varieties heading in the period April 5 to April 25 was noted. The trend of joint worm infestations for varieties heading for this period was 40 percent, as compared with 3 percent for the period May 5 to May 15. However, 14 varieties deviated significantly from the trend, a fact of interest in that host selection and inherited resistance or susceptibility may also be issues along with plant growth and period of heading of these varieties. Six of the most contrasted infestations are given in the following table.

Variety	Expected trend of plant infestation	Recorded plant infestation
	Percent	Percent
Ramona	40	0
Reward	40	89
Canadian Red	13	80
Early Blackhull	13	64
Oakley	3	50
Java	3	41

Planting date in relation to egg deposition.--Morris Schlosberg and Ralph Mathes, Toledo, Ohio, report that in a series of ten weekly plantings of Spanish Gold, Tendergold, Howling Mob, Golden Cross Bantam, and Country Gentleman sweet corn, from May 1 to July 3, at Toledo in 1936, records of egg deposition by the European corn borer revealed the occurrence of second-generation moths in important numbers on the basis of resultant egg deposition on the later planted corn. No second-generation occurrence was recorded in 1935 in a similar series of plantings of 3 strains of sweet corn, although records of slight second-generation pupation in that season were available from other sources, such as in general occurred in previous seasons. It is noteworthy that second-generation pupation was confined to the earlier plantings. Of the total number of eggs recorded during the season (8,036), 69.62 percent (5,595) were laid by first-generation moths and 30.38 percent (2,441) by second-generation moths. The seasonal occurrence of egg deposition by either brood of moths was sharply delimited, that of the first generation extending from approximately June 14 to July 23, and that of the second generation from approximately August 1 to August 24. The peak of egg deposition by the first-generation moths occurred during the week of July 6 to 13, and that of the second-generation moths during the week of August 10 to 17. The seasonal range of egg deposition by the first-generation moths was approximately normal for the Toledo district, although beginning and ending approximately 2 weeks earlier than in 1935. The largest egg masses were laid during midoviposition in the case of both generations. Egg deposition by the first-generation moths was confined almost entirely to the earlier plantings, and that of the second generation to the later plantings. A slight overlapping of first- and second-generation egg deposition occurred on the midseason plantings. Considering egg deposition by both generations of moths, the plantings of May 1, 8, and 15 received 53.47 percent of the total number of eggs laid. The trend of resultant egg populations was downward from early to later plantings, with slight increases in the plantings of June 12 and June 19 over those of May 22, May 29, and June 5, owing to second-generation egg deposition.

Rate of sweet-corn tillering in relation to resultant borer population and ear injury.--A study of the relation of tillering in sweet-corn plants to borer infestation and survival rates was undertaken in 1936 with a single strain of sweet corn, as a supplementary aid in interpreting the results obtained in studies of sweet-corn resistance to the European corn borer. Three rates of tillering were observed, namely, one, two, and three tillers per plant. The required condition of tillering was obtained by eliminating undesired tillers as soon as they appeared. The tiller treatments were tested in quadruplicate in a Latin-square arrangement, with the outside rows protected by buffer rows. To insure uniform conditions of infestation, natural infestation was supplemented with hand infestation of the plants at a rate of two egg masses per plant, the egg masses containing, on an average, 30 eggs. Data were taken from a total sample of 40 plants of each treatment. Records were taken of natural egg deposition, resultant borer populations from both natural and hand egg infestations, and resultant injury to the ears. Data relating to the development of the plants were also taken, consisting of plant-height measurements during the season, tasseling records, and silking records. These data show that the higher rates of tillering were associated with higher resultant rates of egg deposition and borer survival and higher resultant plant populations, but with fewer injured ears as a result of absorption of a large portion of the plant population by the tillers. The data are summarized in the following table.

Plants in sample	Tillers per plant	Total borers in sample	Total borers in--			Total ears in sample	Ears injured	Ears injured
			Main stem	Tillers	Ears			
Number	Number	Number	Percent	Percent	Percent	Number	Number	Percent
40--	0	376	82.71	--	17.29	126	63	50.0
40--	1	348	64.94	23.57	11.49	132	42	31.8
40--	2	404	53.96	40.59	5.45	138	36	26.1
40--	3	424	45.28	50.24	4.48	143	25	17.5
Plants having								
One or less tillers--		362	73.82	11.79	14.39	129	52	40.3
Two or more tillers--		414	49.62	45.42	4.96	140	30	21.4

Effectiveness of insecticides against European corn borer in seed-beet plants.--D. D. Questel, New Haven, Conn., reports that beets are grown for seed each year in the Milford, Conn., area. During the period of oviposition by the first generation of the European corn borer, seed-beet plants are in a growth stage favorable to infestation. For the past few years the borer has so severely damaged the beets that a great many branches and main stems break over, allowing the seed to dry up before maturing. This causes poor germination, with consequent losses to growers. As this is an important crop economically, and as the plants are susceptible to insecticidal treatment, experiments were included in the 1936 field-plot program with the object of determining what protection might be afforded by spray treatments. Phenothiazine was used at the rate of 4 pounds per 100 gallons of water, and tank-mixed nicotine bentonite was used at the rate of

4 pounds processed bentonite and 1 pint of nicotine sulphate per 100 gallons of water. Butyl phenyl-phenol sodium sulphonate (1-2,500) was employed as a wetting and spreading agent in both sprays. The materials were applied with two 15-gallon wheelbarrow sprayers. These were equipped with a 5-gallon auxiliary air chamber, permitting a continuous spray pressure of 100 pounds during all applications. The results obtained in this experiment were as follows: (1) The preparation of nicotine bentonite was superior to phenothiazine as a means of protecting the beet plants from infestation and from breakage occurring at any point in the plant. (2) Phenothiazine showed a reduction in the amount of plant breakage due to treatment of 44.8 percent, as compared with 66.4 percent in plants treated with nicotine bentonite. (3) The number of points of breakage per 100 plants was greatly reduced in plants treated with nicotine bentonite and particularly the number of main stems and side branches received superior protection in these plots, as compared with those in untreated plots.

Limits of dispersion of corn borer parasites in Massachusetts.--C. A. Clark and Emory Burgess, Moorestown, N. J., report as follows on the results of a summer survey to determine the limits of dispersion of Lydella grisescens R. D. and Inareolata punctoria Roman., two imported parasites of the European corn borer, in the vicinity of Malden, Mass. Both species have dispersed uniformly to a distance of approximately 20 miles from the point of original release. This indicates an average rate of spread for both of approximately 1-1/4 miles per year.

JAPANESE BEETLE CONTROL

Conditions of gypsy moth infestation.--As reported by the district inspector at Keene, N. H., the gypsy moth infestation has decreased considerably, although egg clusters are still noticeable on the shade trees and in the woodland. While scouting a greenhouse at Dedham, Mass., a district inspector was shown a nearby infestation which, he states, is the worst he has seen in his district for many years. Every tree on a single property was practically covered with egg masses. Many of the trees in the heavily defoliated sections are now refoliating, so that moth feeding is not now so apparent.

Moth pupae removed from Illinois-bound chairs.--While driving through Rockland, Maine, on August 17, the district inspector noticed shipping tags on two iron antique chairs in the yard of an antique shop. Upon inquiry it was learned that the chairs had been purchased by an individual in Moline, Ill., and were to be shipped that day. Examination of the chairs disclosed eight living gypsy moth pupae, mostly females. Further examination of the articles in the yard revealed gypsy moth egg clusters on an old cannon, a one-horse shay, and statuary.

Satin moths more numerous.--Although no actual scouting has been performed to determine the increase or spread of satin moth infestation, district inspectors report that egg clusters of this species are more numerous than a year ago throughout the area regulated for this insect. Egg clusters are much more noticeable in Cheshire and Sullivan Counties, N. H., and in Bellows Falls, Westminster, and Brattleboro, Vt.

Newly discovered Dutch elm disease infections.--Confirmations were received during the period from Little Silver, Fairhaven, and Holmdel, in Monmouth County, N. J. Finding of these three trees increased the infected zone by 112.68 square miles. Another confirmation of a tree in Hopewell Township in Mercer County, N. J., further extended the infected area by 57.03 square miles. This makes a total of 2,698.64 square miles in the New Jersey infected zone. It was also necessary to add 63.61 square miles to the protective zone in Bucks County, Pa., making a grand total of the protective band in Pennsylvania of 153.26 square miles. A New York confirmation of a tree outside the known infected zone was also received from the town of Huntington, Suffolk County, Long Island. The Suffolk County tree extends the line circumscribing the outermost infections approximately 5½ miles eastward on Long Island. The latter tree is about 6 miles from the nearest previously discovered confirmed tree. A second tree has been confirmed in the town of Minesink in Orange County, N. Y., close to the New Jersey-New York State line and near Port Jervis.

W. P. A. personnel increased.--In an attempt to speed up the elm sanitation work by the quick removal of all standing dead and dying elm trees already tagged for destruction, requests were placed on August 20 with the Works Progress Administration in New Jersey for 2,600 additional workers. The requests call for 2,000 unskilled and 600 skilled laborers, the latter to be furnished under the 30-percent nonrelief exemption allowed. There are now 370,553 dead or more-than-half-dead elms awaiting removal, over 70 percent of which are in New Jersey. Further accretions to this total will be had as the dead and dying tree tagging progresses in conjunction with the systematic scouting now being carried on.

Dead tree tagging started.--Tagging of dead and more-than-half-dead elms to be removed in connection with the elm sanitation campaign has been in progress for several weeks. This is combined with the second or third surveys for diseased trees. Most of the dead-tree scouting in New York has thus far been accomplished on Long Island, Staten Island, and in lower Westchester County. The combined third go-over and dead-tree survey has been started generally over both the infected and protective zones in Fairfield County, Conn. In New Jersey both dead-tree scouting and an elm census are being combined with the second survey for diseased trees.

Scouting of right of ways.--Railroad scouting is well under way. The work is confined principally to towns, switches, and transfer points. The railroads now being worked are the New York Central, Erie, and Lackawanna, from New York City; the Pennsylvania, from Philadelphia; the Baltimore and Ohio and the Western Maryland, from Baltimore; the Norfolk and Western from Norfolk; the Southern, the Illinois Central, the Louisville and Nashville, and the Missouri Pacific, from New Orleans to the Midwest; and the Big Four and other connecting roads in Ohio and Indiana.

Fewer beetles in Philadelphia area.--There has been a decided decrease in the number of Japanese beetles in Philadelphia this year. The waterfront district is practically free from flying beetles, and they have practically disappeared from the parks and public squares nearest the markets.

This same condition has been noted along the water front in Camden, from which in former years the beetle has flown in large numbers to the Dock and Callowhill markets on the Philadelphia side of the river. Despite the decreased beetle population in Philadelphia, 323 beetles were found on produce and cut flowers inspected there from July 15 to July 31. Of this total, 138 were removed from cut flowers and 185 from produce. Produce was inspected at the Philadelphia platform for 249 ships leaving that port.

Short season for blueberries.--Early in August harvesting of cultivated blueberries ceased in the New Jersey pine barren region and the fumigation house at New Lisbon was closed for the season. Usually fumigation of blueberries continues until the end of August, but this year the extreme heat and lack of moisture during July shortened the crop. Many of the express agents contacted in connection with the certification of huckleberries from the Pennsylvania mining regions state that this has been one of the worst years for huckleberries that they have experienced. Some sections report a 15-percent decrease in shipments. They attribute this to a severe winter and a dry summer. An exception was noted at Mount Carmel, where the agent stated that they had already shipped 700 more crates than last year.

Japanese beetle trapping nears completion.--Trapping has been concluded for the season in South Carolina, Tennessee, and Virginia. All traps in North Carolina have been lifted, except those in Winston-Salem, where 37 beetles have been caught. With a few exceptions, all traps placed in the nonregulated section of Maryland have been removed. Traps are still in operation in Georgia, Illinois, Indiana, Kansas, Kentucky, Maine, Michigan, Missouri, New Hampshire, New York, Ohio, Pennsylvania, Vermont, and West Virginia.

Beetle spreads in Hartford district.--There has been a general spread of the Japanese beetle in the Hartford, Conn., district this season. Beetles have been found during the current scouting season at every classified establishment in Hartford, and East and West Hartford. Because of this, several classified firms have dropped their classification. Four Japanese beetles were found on greenhouse premises at Springfield, Mass., and six were caught in traps operated some distance from this greenhouse by the Springfield Park Department.

N. Y. A. girls act as trap tenders in Erie.--Of 20 youths assigned by the National Youth Administration to Japanese beetle trapping in Erie, Pa., 14 are girls. These employees work two 5-hour days per week, and are paid at the rate of 50¢ per hour. According to the trap supervisor, the girls display slightly more enthusiasm in this work than do the boys.

Concord, N. H., undertakes Japanese beetle control.--City officials at Concord, N. H., have sprayed the foliage of trees and shrubs in the vicinity of the Japanese beetle infestation in that city.

FOREST INSECT INVESTIGATIONS

Grasshoppers defoliate ponderosa pine.--Owing to the shortage of preferred host materials, many thousands of ponderosa pine trees on the Custer National Forest in eastern Montana were defoliated by grasshoppers in August. This forest, which has suffered from drought for the past few years, was swept by devastating epidemics of grasshoppers and Mormon crickets during the past season. After all green vegetation on the forest floor had been devoured, the grasshoppers were apparently forced to feed on pine foliage. J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, states that this attack occurred around the edges of grass areas devoid of all green vegetation and often extended back into the forest several hundred feet. In many localities the attack was so severe that large areas of trees from 25 to 30 feet high were completely defoliated. So scarce was food material for these invading hordes of grasshoppers that standardized wood cylinders used to record the moisture content of fuel materials in relation to forest-fire danger were fed upon so heavily that their value was seriously impaired.

Mountain pine beetle survey nears completion.--Mr. Evenden also reports that the 1936 survey of the mountain pine beetle infestation within the white pine stands of the Coeur d'Alene National Forest, which started on August 10, will be completed during the latter part of September. This survey has been conducted annually for the past 6 years in order to determine the effects of the control measures conducted against this infestation during the years 1930 to 1934, inclusive. About $290,000 was spent in this operation, which was the largest bark-beetle control project ever undertaken. No control measures were conducted during the season 1935, as it was believed that the infestation had been restored to normal and, though this season's survey has not been complete, the data obtained indicate a still further reduction in the severity of the infestation. In comparing the present condition of the Coeur d'Alene National Forest with other areas where no control measures were undertaken it is very evident that as a result of this operation the valuable white pine stands of this forest have been preserved, for had the epidemic been allowed to develop to its maximum severity a large percentage of the commercial timber would have been destroyed.

A method for detecting liberated beetles.--A. E. Lantz, of the Morristown, N. J., laboratory, has suggested a method to be used in connection with flight studies that R. R. Whitten of the same laboratory is carrying on with the smaller European elm bark beetle (Scolytus multistriatus Marsh.) and the native elm bark beetle (Hylurgopinus rufipes Eich.). In these studies thousands of beetles are liberated at a central point. Elm logs are put out at measured distances from this point to attract the beetles. As other beetles of both species are present in the area, it was necessary to determine whether or not the beetles attracted to the logs were those that had been liberated. The procedure suggested by Mr. Lantz has given dependable results. Before the beetles are liberated they are submerged in a saturated solution of sodium hyposulphite, from which they are later removed and drained. Beetles attracted to the logs are collected individually in gelatine capsules. As soon as possible after they have been collected, each beetle is placed in a small glass vial containing about 2 cc of distilled water and a drop of potassium permanganate-sodium hydroxide indicator. When beetles that have been submerged in the solution of sodium hyposulphite before liberation are placed in the vials the liquid in the vials changes from purple to yellow. C. L. Griswold, of the Morristown, N. J., laboratory, submits data indicating how many adults of the native elm bark beetle may issue from a square foot of bark surface. Infested material, consisting of approximately 130 square feet of bark, was collected in Westfield, Mass., on July 14. Between July 17 and August 31 approximately 51,884 beetles issued, an average of 399 beetles per square foot.

Parasites of European spruce sawfly liberated.--P. B. Dowden and P. A. Berry, New Haven, report liberation of the following parasites of Diprion polytomum Htg. These parasites were received from the Dominion Parasite Laboratory, Belleville, Ontario, and are European species. The host species in all instances was D. polytomum.

Place	Parasite	
	Species	Number
Connecticut:		
Orange	Microplectron fuscipennis	30,000
Maine:		
Bar Harbor	do.	30,000
Masardis	do.	20,000
Presque Isle	do.	30,000
Massachusetts:		
Petersham	do.	20,000
New York:		
Raquette Lake	do.	20,000
Tupper Lake	do.	30,000
Vermont:		
Mendon	do.	20,000
Connecticut:		
Orange	Exenterus abruptorius	1,351
New York:		
Tupper Lake	do.	1,460

The M. fuscipennis were sent from Canada as pupae still within their host cocoons. The host cocoons were put up in small frames which allowed the adult parasites to issue normally. Issuance started almost immediately after the frames were placed outside. The E. abruptorius were sent as adults.

Other parasite liberations.--Messrs. Dowden and Berry also report the liberation of two species of larch case bearer parasites in Maine and several species of European pine shoot moth parasites in New York and Connecticut. A colony of 500 mated females of Ephialtes examinator was sent to the Dominion Parasite Laboratory at Belleville, Ontario. These parasites were liberated by the Canadian officials at Toronto, Ontario.

European spruce sawfly not gaining in Maine.--H. J. MacAloney, New Haven, reports that there does not appear to be any noticeable increase in European spruce sawfly infestation in northern Maine. Cocoon counts showed less than one sound cocoon per square foot, but over an area of several hundred square miles there is obviously a population present that, under favorable conditions, could develop into epidemic proportions. This area will be studied intensively in 1937 and sample plots will be established to determine the fluctuation in population and the extent of damage.

Sawfly discovered in isolated pine plantations in Nebraska.--The first evidence of a defoliator in the pine plantations which comprise the Nebraska National Forest was the discovery of a small infestation of a sawfly on August 13 by L. G. Baumhofer, of the Fort Collins, Colo., laboratory. These plantations are some 50 or 60 miles from the nearest native pine timber, and the method and source of introduction for the sawfly is a mystery. The infestation is located at the east edge of the plantings, adjacent to open sandhills and a mile from the main road and the nursery. The outbreak covers 1-1/2 acres of ponderosa pine, with part of the trees heavily defoliated, except for the current needles. The sawfly, probably a species of Neodiprion, was in the larval stage in cocoons in the soil in mid-August. Empty cocoons indicated that the insect had been present for at least two seasons. The destruction of the old needles by the sawfly, combined with the prevalent damage to new growth shoots by the pine tip moths, probably cause serious losses to pine in the plantations and an attempt is being made to eradicate the sawfly.

Spruce bark beetle takes its toll.--H. J. MacAloney and J. V. Schaffner, Jr., New Haven, report that a reconnaissance of the Falls Brook Drainage of the Green Mountain National Forest revealed the fact that over 90 percent of the merchantable spruce over an area of about 500 acres has been killed by the eastern spruce bark beetle. The infestation is spreading to the adjoining Battell Memorial Park, where control measures must be instituted if the large spruce is to be saved.

Insecticides tested in control experiments.--S. F. Potts, New Haven, reports on experiments conducted for the control of the European pine shoot moth with insecticides. The following insecticides were tried: Lead arsenate 3-100 and 6-100, with linseed oil; derris 4-100 and 8-100, with 1 percent linseed oil; lime sulphur 1-20; bordeaux mixture 4-4-50; nicotine tannate 1-400, with 1 percent linseed oil; phenothiazine 6-100. Some measure of control was obtained from the heaviest dosage of lead arsenate, but the derris coated with linseed oil was the most effective insecticide, giving approximately 75-percent control. Mr. Potts reports that preliminary tests indicate that larvae of the European spruce sawfly are very susceptible to lead arsenate, calcium arsenate, derris residue, derris, and lime sulphur concentrate. The following concentrations of these insecticides were very effective: Lead arsenate, 2 pounds to 100 gallons containing 0.17 linseed oil; calcium arsenate, 2 pounds to 100 (containing a 0.5-0.5-50 bordeaux mixture); derris residue, 0.5 to 100 (containing 0.5 percent linseed oil); derris (4 percent rotenone), 2 to 100 (containing 0.5 percent linseed oil); lime sulphur concentrate, 1 to 33. Larvae of this sawfly were very resistant to nicotine sulphate, nicotine tannate, phenothiazine, and pyrethrum.

The Black Hills beetle establishes an emergence record.--During the period August 7 to 14, 1936, a record emergence was established by the Black Hills beetle (Dendroctonus ponderosae Hopk.), according to J. M. Whiteside, Fort Collins. At an elevation of 10,000 feet on Elk Mountain, Wyo., 287 adult beetles emerged from 2 square feet of bark of limber pine (Pinus flexilis) in 1 week. The infested trees were attacked during August 1935. The heaviest emergence over a similar period from identical cages in that year was 232 adult beetles collected at an elevation of 8,000 feet during the period August 7 to 14. Records during 1935 showed that at 10,000 feet heaviest emergence was 156 adults from 2 square feet of bark, but this occurred nearly a month later than the present record. These records indicate a much heavier and much earlier emergence in 1936 than in 1935.

Beech scale increased.--R. C. Brown, of the New Haven, Conn., laboratory, reports that during the latter half of August examination was made of the permanent sample plots established in 1933 in Maine for a study of the beech scale in connection with the Nectria problem. These plots are distributed over a considerable portion of the central and eastern parts of the State. Over this entire region there has been an appreciable increase in intensity of scale infestation and in some plots a tremendous increase was noted. An increase in Nectria infection was also observed. The beech scale predator, Chilocorus bivulnerus Muls., was present throughout the area, but has apparently been unable to check appreciably the increase of its host. In the Boston, Mass., district a marked increase in degree of scale infestation was observed in a number of localities. The death of one large beech this season in the town of Beverly, Mass., is of particular interest. This tree was heavily infested with the scale in 1935 and again in 1936 and has apparently died from insect attack. Only one small area of bark, covering some 25 square inches, is, at present, visibly infected with the fungus, Nectria. Sample plots have been established on Long Island, N. Y., Westchester County, N. Y., and Hartford, Conn.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Emergency workers in moth control.--Gypsy moth work since the close of the spraying season early in July has been carried on with a reduced force of W. P. A. workers. On August 31 there were 2,869 W. P. A. workers employed in the New England States (except Rhode Island), New York, New Jersey, and Pennsylvania on the gypsy moth project. On the same date 259 W. P. A. workers were engaged in brown-tail moth work in Maine, New Hampshire, Vermont, and Massachusetts. During August there were 1,430 C. C. C. men engaged on gypsy moth work in Vermont, New Hampshire, Massachusetts, and Connecticut, in the area adjacent to and east of the barrier zone along the Connecticut River.

Report on spraying work.--Most of the spraying for control of the gypsy moth is done in difficult terrain. In Tobyhanna township, Pa., the spraying crew performed an interesting piece of engineering. The area to be sprayed was situated across the Lehigh River from the only road on which the spray-pump truck could travel to within striking distance of the job to be done. An iron cable 400 feet long was thrown across the river at the nearest point approaching the area to be covered, fastened at each end, and supported by piers constructed of stones from the river bed and logs cut on the spot. A convenient foot passage was made by placing planks between the piers; then the spray hose was attached to the cable and placed across the river from the pump truck to the field of operations. During the spray operations against the gypsy moth a total of 68 sprayers were used, as follows: 32 in Pennsylvania, all working on double-shift; 17 in Connecticut, 4 working double-shift; 10 in Massachusetts, 4 on double-shift; 1 in New Hampshire, double-shift; 5 in Vermont, all starting on double-shift but the working of the men on Saturday was disapproved by the W. P. A. director for that State, hence, the double-shift system was discontinued. Weather was favorable during most of the spraying season and it was necessary to obtain more lead arsenate. One emergency lot of 50 tons and another of 20 tons were procured during the spraying season. In some of the areas being sprayed the source of the water gave out, making it necessary to move to a new place for water or lay out more hose; in some instances several thousand feet were necessary. In one locality in Vermont 7,000 feet were required, with the pump working under a pressure of 1,500 pounds. The 12 new-type sprayers purchased this season have been thoroughly tried out and have given satisfactory service. Several of these machines were worked on a double-shift schedule and operated continuously 10 hours each day. Practically no mechanical difficulty was encountered and they appeared in good condition at the end of the season. These sprayers are equipped with a self-contained power unit capable of running the pump at a pressure of 1,500 pounds. These units are set on a 1-1/2 ton chassis and are driven to set-ups where it would be much more difficult to reach with the heavier type machines used in this activity for a number of years. At the end of the season these units are removed and the trucks are used for hauling supplies. In many of the areas where spraying was done it was necessary to erect barbed-wire fences around the treated area or on some sides of it to keep cattle from entering. When the spraying was completed it was necessary to have men patrol the fences, as these sometimes get broken by falling limbs or other causes--some were deliberately cut by unknown persons. At Tobyhanna, Pa., a deer ran into one of the fences and broke it down. The deer's neck was also broken. In areas where fish oil was used as an adhesive these fences are patrolled until fall. In treated areas, where fish oil is not used as an adhesive, the patrolling is continued until after one or two heavy rains which reduce the spray deposit on the undergrowth to a minimum; then it is discontinued.

Bait trapping for gypsy moth.--Assembling-cage work has been under way for the usual purpose of checking new infestations and reinfestations in sections where regular scouting could not be carried on. These cages are baited with an attractant and placed in the field to lure and trap the male gypsy moth. The attractant used in the cages is obtained from female gypsy moths, and a collection of 672,702 female pupae was made, largely in

Franklin County, Mass., from which moths were reared for that purpose. While the collection was made primarily for attractant material, it should help in reducing infestation in the collection area next year.

PLANT DISEASE CONTROL

Barberry-eradication work in Ohio.--The use of emergency funds to employ laborers on the barberry eradication program in Ohio since August 1935 has made possible the destruction of more than 260,000 barberry bushes on 1,711 properties. During this period approximately 95 percent of all the men employed were taken from relief rolls and 377,416 man-hours of labor were used. Of the total amount of money expended, 94 percent went to labor. The cost per man-year, based on total expenditures, was $776.46. The enlarged program made possible by the use of emergency funds afforded an opportunity to make a systematic coverage of 7,235 square miles of territory in 30 counties. The area covered consisted of waste land, wooded land, river banks, and cultivated rural as well as urban sections. In the territory surveyed barberries had escaped cultivation on 817 properties. The enlarged program made it possible to bring these extensive areas of infestation under control.

Barberry eradication prevents damage to grain crops in Pennsylvania.--During the past year, since barberry eradication was begun in Pennsylvania with funds allotted by the Works Progress Administration, 1,200 square miles of territory in eight counties have been intensively surveyed for rust-susceptible barberries. Within this area 1,301,513 barberry bushes have been destroyed on 1,751 properties. Numerous areas of escaped bushes in the territory have been surveyed where farmers in the immediate vicinity of the bushes had reported repeated failures of small-grain crops because of stem rust epidemics caused by the proximity of barberry bushes. In a few of these areas the bushes were eradicated before they became infected in the spring. As a result of the eradication work, the grain fields in the vicinity of the completed areas were not damaged by stem rust during the past summer, whereas grain fields near barberry bushes throughout the State were, in general, heavily rusted. There was no noticeable stem rust damage this year in northern Lackawanna County, where many farmers in past years have been forced to abandom growing oats because of stem rust losses.

Another blister rust infection center found in California.--Scouting in northern California resulted in the location of 120 Ribes bushes and 2 sugar pines infected with blister rust. Infections were found on R. bracteosum, R. sanguineum, and R. lobbii. This infection spot was about 5 miles south of the Oregon border along the East Fork of Indian Creek and is the first infection found south of the summit of the Siskiyou Mountains in California. It is located in sugar-pine type, and numerous Ribes of several species occur all through this area. The discovery of this infection is of particular significance in that it discloses the rust to be established south of the Siskiyou in a region where sugar pines and Ribes are numerous and conditions for the general spread of infection over the northern Sierras into commercial pine areas are most favorable.

Midwest drought reduced infection on Ribes.--The prolonged Midwest drought had very noticeable pathological and physiological effects upon Ribes in the North Central States. The intense heat, together with the lack of precipitation for 3 months, greatly reduced the usual intense infection on Ribes. It is also reported that telia were late in forming and appeared very sparsely. A large number of the upland Ribes species were completely defoliated; however, some of these defoliated bushes are producing new leaves since the recent rains.

New blister rust demonstration area.--District leader H. G. Bradbury, in charge of blister rust-control activities in Waldo and Knox Counties, Maine, recently established a roadside demonstration near the town of Belfast. The area comprises about 2 acres of uneven-aged pine, ranging from seedlings up to trees 12 inches in diameter. About 65 percent of the pines are infected with blister rust and each diseased tree has been marked with yellow paint. Dead and dying trees of all sizes are conspicuous. Suitable signs, calling attention to the damage caused by the disease and the need for control, are so situated that people stop and inspect the area. The average attendance has exceeded 50 per day since the demonstration was established August 22, and 138 persons visited it on Sunday, August 30. An attendant has been on hand to guide visitors through the area and to explain to them the nature of the disease and its control.

Blister rust workers in Colorado camp experiment in planting grass seed on soil disturbed through Ribes eradication.--An interesting and what may prove to be a valuable experiment was started this summer in a blister rust-control camp in Colorado. An old-time rancher who lives in the vicinity of the camp conceived the idea that a few pinches of grass seed dropped by the Ribes eradicators on the soil disturbed through the eradication of each Ribes bush would aid in renewing the reduced range cover on certain areas being worked. This experiment seemed practical, as it would require very little of the eradicator's time and would not involve the transportation of a weighty or bulky load; therefore, after a discussion with several interested parties some seed, consisting of bromegrass, wheatgrass, and sweetclover, was obtained from the Soil Conservation Service and sowed in July. Some grass had started from the plantings by the latter part of the month but dry weather prevented good germination. The heavy rains that have fallen since are expected to aid germination and provide enough moisture for good growth.

COTTON INSECT INVESTIGATIONS

Toxicity of insecticides against cotton flea hopper.--K. P. Ewing, Port Lavaca, Tex., summarizes the cage toxicity tests conducted during the summer of 1936 with 20 dusting materials against Psallus seriatus Reut., as follows:

Insecticide	Mortality of--		
	Adults	Nymphs	Average
	Percent	Percent	Percent
40% pyrethrum-60% sulphur	71.0	93.5	82.3
10% paris green (air-floating)-90% sulphur	82.0	71.8	76.9
20% pyrethrum-80% sulphur	47.6	81.5	64.6
10% paris green (regular)-90% sulphur	56.0	72.4	64.2
7½% paris green-92½% sulphur	49.3	68.3	58.8
5% paris green-95% sulphur	47.9	68.4	58.2
20% pyrethrum-10% paris green-70% sulphur	28.3	74.4	51.4
10% pyrethrum-90% sulphur	18.1	79.9	49.0
Sulphur (325-mesh 97% sulphur)	15.2	76.0	45.6
10% pyrethrum-10% paris green-80% sulphur	25.5	62.7	44.1
20% pyrethrum-5% paris green-75% sulphur	19.6	66.5	43.1
10% pyrethrum-5% paris green-85% sulphur	29.9	52.2	41.1
20% calcium arsenate-80% sulphur	25.2	56.9	41.1
10% pyrethrum-10% cube-80% sulphur	15.0	67.0	41.0
23.5% devil's-shoestrings-76.5% sulphur	11.8	63.8	37.8
33 1/3% calcium arsenate-66 2/3% sulphur	24.1	49.2	36.7
50% calcium arsenate-50% sulphur	23.0	48.3	35.7
47% devil's-shoestrings-53% sulphur	9.2	42.2	25.7
Calcium arsenate	30.6	10.2	20.4
94% devil's-shoestrings-6% sulphur	8.4	26.7	17.6
Untreated checks--average mortality among 865 adults in 18 cages and 998 nymphs in 21 cages	6.0	11.0	8.5

In the treated cages 5,628 adults and 3,628 nymphs were used, or an average of 281.4 adults and 181.4 nymphs for each material tested. The pyrethrum used contained 0.9 percent total pyrethrins and the devil's-shoestrings (Cracca virginiana), furnished by the Bureau of Plant Industry and analyzed by the Division of Insecticides, contained 1.72 percent rotenone and 7.5 percent total extractives $(C\,Cl)_4$. Eighteen of the materials tested caused higher mortality among nymphs than adults. Only two, the mixture of 10 percent air-floating paris green and 90 percent sulphur, and calcium arsenate, caused higher mortality among the adults. For use against the cotton flea hopper these tests indicate that little can be expected from the rotenone-containing materials, devil's shoestrings, cube, and calcium arsenate, but that effective control can be obtained from sulphur, and sulphur-paris green and sulphur-pyrethrum mixtures.

Notes on egg parasites of the cotton flea hopper.--Mr. Ewing and H. J. Crawford report concerning the recently discovered egg parasites of the cotton flea hopper as follows: "The emergence from collections made in different places in a field of croton at Olivia, in Calhoun County, indicated that the percentage of parasitization of cotton flea hopper eggs was higher where the croton plants were growing among senna weeds. It is possible that the partial protection from the sunshine, wind, or rain was beneficial to the parasites; however, the percentage of parasitization has not been found high in collections made in woods. The comparisons indicate that the percentage of parasitization of flea hopper eggs was higher in the first half of July than during the latter part of the month. From a collection made July 6, 41 flea hoppers and 68 parasites emerged. A collection was made in the same field July 30 and 42 flea hoppers and 40 parasites emerged. The percentage of parasitization of the first collection was 62.4, whereas that of the latter was 48.8. In another field the percentage of parasitization in a collection made on July 13 was 88.5, and in a collection of July 24 it was 62.8."

Control of the cotton leaf worm by insecticides.--Mr. Ewing also reports that opportunity to note the degree of field control of the cotton leaf worm from the different materials used in boll weevil control experiments at Edna, Tex., presented itself when there was a sudden and extra heavy infestation of leaf worms in all experiments during the latter part of July. The materials that were being tested for boll weevil control by dusting at 5-day intervals were: 50 percent calcium arsenate and 50 percent sulphur; 33-1/3 percent calcium arsenate and 66-2/3 percent sulphur; 20 percent calcium arsenate and 80 percent sulphur; 10 percent regular paris green and 90 percent sulphur; 10 percent special paris green and 90 percent sulphur. All of these materials gave perfect control, except the mixture of 20 percent calcium arsenate and 80 percent sulphur. In order to control the leaf worm, one plot dusted with this mixture had to have an application repeated within 3 days, instead of waiting for the 5-day routine dusting schedule. The 10 percent paris green-sulphur mixtures gave quicker results than any of the other materials in checking the leaf worms and the 33-1/3 percent calcium arsenate-sulphur mixture gave the slowest results of any of the effective materials.

Internal boll diseases of cotton distributed by insects.--T. P. Cassidy and L. D. Christenson, of Buckeye, Ariz., in a preliminary report on the causes and abundance of internal boll diseases of cotton, such as stains, spotting, and rotted seeds, have found that disease occurs only after the boll wall has been punctured, allowing some pathogen to gain access. In the Salt River Valley the instruments of infection are mainly the boll-puncturing insects. In eight fields on which records were made an average of 39.4 percent of the green bolls were insect-punctured and more than 90 percent of the punctured bolls were stained. A number of fungi and one bacterial organism have been isolated from internal-boll-disease cases which followed feeding by common pentatomids. Of these, the bacterial form shows a definite tendency to produce yellow or brown discolorations, even staining nutrient agar to approximately the same color as typical lint stains. Under experimental conditions, this organism (which has been designated for the time being as Bacteria A), upon inoculation into clean unpunctured bolls by means of a hypodermic needle, produced lint stains and internal rot identical in appearance with conditions so commonly encountered in cotton fields. Inside of bolls inoculated in the same manner with sterile water, no lint stains or other rot conditions develop when wounds formed by the needle are protected from infection by an aseptic dressing or a hot paraffin plug. This fact plus the fact that the bacterial suspension produced internal disease has been demonstrated in experiments so frequently that it may be considered almost conclusive.

The bolls inoculated with the bacterial suspension were dressed or paraffined in like manner to prevent external contamination. Inoculations made on immature lint dissected from clean unpunctured bolls, placed in test tubes plugged with cotton and sterilized, developed stains in 72 hours from the time of inoculation. The checks remained white and unchanged, even though exposed to the air, and indicate that oxidation processes are not directly responsible for lint stains. Bolls pricked through the exocarp with a sterile needle in the field developed severe lint stains in a goodly percentage of cases. In this experiment the bolls were sacked after being pricked, to prevent insects from attacking them. The wounds from the needle, however, were not sterilized and were left exposed with no protection from subsequent infection. The fact that most of these bolls developed stains readily within a week's time indicates that staining organisms are of rather general distribution and are not necessarily dependent on insects for their distribution. These studies are being continued in cooperation with the plant pathologist of the Bureau of Plant Industry stationed at Sacaton for checking their pathological accuracy.

Long-cycle larvae of pink bollworm in Puerto Rico.--L. C. Fife, Mayaguez, reports on experiments conducted to determine the percentage and duration of long-cycle pink bollworm larvae in open bolls and the duration of long-cycle larvae in soil cocoons. Of 910 cocoons in tests on the northern coast and 960 cocoons on the southern coast during June and July, none were recovered when examinations were made 30 and 36 days after they were installed. Very few long-cycle larvae occurred in open bolls on the northern coast during this period, as less than 1 percent of the larvae installed in the middle of June were present a month later. On the southern coast, however, of 471 fourth-instar larvae in bolls installed on June 23, 24. or 5.1 percent, remained inactive and had not pupated after 31 days, and 11, or 2.3 percent, after 62 days. At Boqueron, on the southern coast, an experiment was started on August 1 by installing 374 fourth-instar larvae in cages under shelter to protect them from the sun and rain, and the same number in cages in the open. Thirty days later 94, or 25.1 percent, of the larvae under shelter were inactive, while only 7, or 1.9 percent, of those placed in the open had not pupated. These results indicate that rainfall and temperature are important factors influencing the number of long-cycle larvae that develop in open bolls. Dry weather seems to increase the duration of this inactive or long-cycle larval stage in the tropics, while the development of resting-stage larvae in the temperate zone has usually been attributed to lower temperatures.

Degree of injury to cotton in Puerto Rico by Dysdercus spp.--Mr. Fife made a survey of cotton fields along the northern coast of Puerto Rico to determine the amount of stainer injury to mature green cotton bolls. Although pentatomids cause some of this stainer injury, during the present season most of it was caused by Dysdercus neglectus Uhl., with some caused by D. andreae L. Of 24 fields examined, the boll injury per field averaged 25.7 percent, ranging from 1 percent at Hatillo to 76 percent at Quebradillas.

Parasites of pink bollworm in Puerto Rico.--Mr. Fife reports that the parasites Chelonus blackburni Cameron and Exeristes roborator Fab., recently introduced through the cooperation of the Division of Foreign Parasite Introduction, have been recovered at Isabela, P. R. Specimens of both species were obtained from open cotton bolls heavily infested with pink bollworms and C. blackburni was also recovered from heavily infested mature green bolls, but each of these species has so far parasitized less than 2 percent of the bollworms. Studies will be continued to determine whether the parasites become more effective. A native parasite, Perisierola of a new species near P. nigrifemur (Ashm.) (det. C. F. W. Muesebeck), is also present but on less than 1 percent of the pink bollworms. It is an external parasite and several individuals will mature on one pink bollworm.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Rio Grande Valley infestation.--The finding of the new pink bollworm infestation in the lower Rio Grande Valley was discussed in the last number of the News Letter (vol. III, no. 8). Gin-trash inspections in this area were completed on August 22. On the Mexican side of the river additional specimens were found, a total of over 300 being taken at Matamoros and at Reynosa, about 60 miles up the river from Matamoros. On the Texas side additional specimens were found at Brownsville and San Benito. A total of 4 specimens was found at Brownsville and 19 at San Benito, both of these towns being in Cameron County. At Rio Grande City, in Starr County, 1 specimen was found. This makes 24 specimens found on the Texas side. Quarantine No. 52 was amended effective August 17 so as to add the counties of Cameron, Hidalgo, Starr, and Willacy to the lightly infested areas. It was necessary to include the two counties in which no specimens were found because seed cotton moves through them for ginning, without regard to county lines. A sufficient number of inspectors has been placed in the area to enforce the regulations. Inasmuch as most of the cotton crop had been ginned when the infestation was found, it was impracticable to install sterilizers; however, all the seed produced after the regulations went into effect was sent to designated oil mills, where they were given a heating or precooking immediately upon arrival. The lint was required to be compressed. The necessary equipment for treating the various products will be installed before the next crop is produced.

Gin-trash inspection.--After completing inspections in the lower Rio Grande Valley, the gin-trash machines were moved to various locations immediately surrounding the new regulated area. After thorough inspections had been made at each point they were moved a little farther northward. By the end of the month a considerable amount of trash had been inspected without finding any indication of the pink bollworm. In the Southeastern States gin-trash inspection was begun on August 17. One mobile and two hand machines are being operated in the regulated area of northern Florida and all trash is being inspected, and four mobile and two hand machines are operating in the nonregulated part of Florida, also in southern Georgia and Alabama. Conditions are more favorable for inspections this year than for the past several years. This is due to the fact that there has been very little rain and the gin trash contains very little sand and dirt.

Consequently, a bushel of trash represents quite a few bales, whereas last year a bushel of trash represented only one or two bales. A considerable amount of trash has been inspected with negative results.

Wild-cotton eradication.--The eradication of wild cotton in southern Florida has been resumed on a small scale. There are four W. P. A. crews operating along the west coast and one on Key Largo. Small crews are being used and each is in charge of a W. P. A. man with considerable previous experience. Reports indicate that wild-cotton seedlings have been growing very rapidly and range in size from quite small to plants 4 or 5 feet high, the larger ones being full of squares. It is to prevent these larger seedlings from producing fruit before work can be resumed on a large scale later in the fall that the small crews are being used at this time. From the work so far done, it is evident that these plants would undoubtedly have produced mature fruit before that time.

Thurberia-plant eradication.--Very good progress continues to be made in eradicating Thurberia plants in the Santa Catalina Mountains of southern Arizona. This work is also being done with W. P. A. funds to prevent weevils which infest the plants from spreading to cultivated cotton. There was considerable rain during the month but this occurred mostly in the late afternoons, so that practically no time was lost from work. In a number of instances, however, the auto trails were washed out in places. During August 4,400 acres were covered, from which 154,496 plants were destroyed. This is a much smaller acreage than was covered the previous month; however, there was about a 50-percent increase in the number of plants destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cost of handpicking hornworms on tobacco in Florida.--A recent field survey conducted by F. S. Chamberlin, of the Quincy, Fla., laboratory, disclosed that in the north Florida tobacco-producing region, the cost of handpicking tobacco hornworms, principally Protoparce sexta Johan., averaged 89 cents per acre on shade-grown tobacco and 85 cents per acre on sun-grown tobacco. These figures are based on the prevailing cost of labor for adults and children in northern Florida. The estimated control achieved by handpicking methods in vogue averaged 65 percent for the shade-grown tobacco and 62 percent for the sun-grown. While handpicking has been recommended under certain conditions as an aid to the control of the tobacco hornworms in many of the tobacco-producing sections of the United States, no data on the cost involved have heretofore been made available.

Tobacco hornworm feces show presence of nicotine.--An analysis of a sample of feces of Protoparce sexta Johan. collected and submitted by F. S. Chamberlin, Quincy, Fla., revealed the presence of 0.61 percent nicotine, indicating that some, at least, of the nicotine ingested by tobacco hornworm larvae is eliminated from the digestive tract. The analysis was made by workers of the Insecticide Division of this Bureau.

Barium fluosilicate controls margined blister beetle on lima beans.--L. W. Brannon, of the Norfolk, Va., laboratory, reports that a severe infestation of the margined blister beetle on young Fordhook lima beans grown on the Eastern Shore of Virginia was controlled by the application of an undiluted barium fluosilicate dust at the rate of 10 to 12 pounds per acre. At the time this insecticide was applied the plants had not started blooming. Two days after the treatment it was impossible to find any blister beetles in the 2 acres involved in this test. The insects had either crawled away and died or were driven out of the field as a result of the treatment. The same phenomenon was observed 7 days after the treatment was applied. Previous attempts by the grower to control the blister beetles with a calcium arsenate-sulphur-lime dust mixture and with a derris dust mixture containing 0.75 percent rotenone had been unsuccessful.

Number of tomato fruits destroyed by one tomato fruitworm.--In laboratory experiments performed by M. W. Stone, of the Alhambra, Calif., laboratory, it was shown that each larva of the tomato fruitworm (Heliothis obsoleta Fab.) is capable of destroying, on an average, six tomato fruits during its larval period. The number of tomato fruits destroyed by each larva included in the experiment ranged from 4 to 10. From detailed observations, it is believed that where tomato fruits located in close proximity to each other were damaged by tomato fruitworm larvae, in many instances a single larva was responsible for the damage. These studies also demonstrated conclusively that tomato fruitworms are migratory in their habits and commonly travel from fruit to fruit during their period of larval activity.

Trap lights no aid in control of tomato fruitworm in California.--Results of preliminary field experiments to determine the possible efficiency of light traps of the electrocuting type, as an aid to the control of the tomato fruitworm (Heliothis obsoleta Fab.) in California, conducted by J. C. Elmore, Alhambra, Calif., gave no evidence that the use of the trap lights had reduced the infestation in the fields where they were operated. Fields grown under comparable conditions without trap lights were used as a basis of comparison.

Crude naphthalene excels other tested soil fumigants against wireworms in Pacific Northwest.--R. S. Lehman, of the Walla Walla, Wash., laboratory, reports that recent field tests with soil fumigants against the sugar beet wireworm (Limonius californicus Mann.) have demonstrated that crude naphthalene at the rate of 800 pounds to the acre was more effective and cheaper than either calcium cyanide at the rate of 400 pounds to the acre or a commercially prepared soil fumigant consisting principally of crude naphthalene and silica at the rate of 22 parts of the former to 78 of the latter. Whereas crude naphthalene killed approximately 92 percent of the wireworms, calcium cyanide killed approximately 78 percent and the commercially prepared soil fumigant killed 68 percent.

Imported parasites of pea weevil released in Idaho.--T. A. Brindley, of the Moscow, Idaho, laboratory, reports that during 1936 a total of approximately 21,000 living adults of the imported pea weevil parasite

(Triaspis thoracicus Curtis) were received from Europe by way of the Moorestown, N. J., laboratory of this Bureau, and released in pea plantings heavily infested with the pea weevil (Bruchus pisorum L.). The parasite shipments involved a total of approximately 30,000 individuals. Part of these were reared at Moorestown from beans imported from Europe and the parasite adults were shipped to Moscow and an average of approximately 3 percent of the parasites died in transit. The remainder of the parasites were shipped as adults from Europe and in these shipments the parasite mortality in transit averaged approximately 37 percent. Field collections will be made at stated intervals to determine whether these parasites become established in Idaho.

Corn kernels best food for rearing Pacific coast wireworm larvae.--K. E. Gibson, Walla Walla, Wash., reports that laboratory studies in rearing larvae of Limonius canus Lec. have shown that sterilized corn kernels were more suitable for the survival and growth of the wireworm larvae than were sterilized wheat kernels, potato roots, potato tubers, or alfalfa roots. The larvae fed on corn kernels were from two to three times the size of larvae fed on the other foods, after the expiration of approximately 2 months of feeding.

Imported parasites of lima bean pod borer released in California.--Rodney Cecil, of the Ventura, Calif., laboratory, reports that during 1936 a total of 197 adults of the parasite Microbracon piger Wesm. had been released up to the end of August in territory infested by the lima bean pod borer. Also, 52 specimens of the imported parasite Phanerotoma sp. had been liberated. This parasite material was collected in France and forwarded to Ventura, being relayed from the Moorestown, N. J., laboratory.

Increase in weed hosts of beet leafhopper in California.--F. R. Lawson, of the Modesto, Calif., laboratory, reports that in the Los Banos-Mendota, Stanislaus, and Merced sections of California a marked increase has been recorded in 1936 in the acreage of wild host plants of the beet leafhopper. During 1935 a total of 15,227 acres of wild host plants were present, as compared with 21,140 acres in 1936 in the same sections. The principal species of host plants involved were Russian-thistle (Salsola pestifer Nels.), Bractscale (Atriplex bracteosa Wats.), and fogweed (Atriplex argentea expansa Wats.).

INSECTS AFFECTING MAN AND ANIMALS

Bone oil and pine tar oil for control of primary screw worm.--At the Dallas, Tex., laboratory, Roy Melvin and R. C. Bushland have conducted tests of the comparative effectiveness of bone oil and pine tar oil as insecticides for control of Cochliomyia americana Cushing and Patton. A brief summary of the work follows: (1) Two repellent tests conducted with guinea pigs in screened cages showed that bone oil is not as effective a repellent as is pine tar oil (sp. gr. 1.065). Results of tests conducted in July showed little or no difference between the repellent action of the two materials. High temperature as affects volatility and viscosity might explain these differences. (2) The mortality of guinea pigs treated with bone oil was alarmingly high, especially where large and deep wounds were involved. (3) Bone oil is effective against younger larvae but does not give effective control of older larvae. (4) In dipping tests bone oil was about half as toxic to larvae as was pine oil (based on 500 larvae for each material); (5) In ovicidal studies in which eggs were dipped, no marked difference in the toxicity of the two materials was noted (based on several thousand eggs for each material).

Tiny thief ant destroys newly emerged screwworms.--Messrs. Melvin and Bushland also report that at the Dallas laboratory pupae of *C. americana* and *C. macellaria* Fab., in small screen cages, were placed in an improvised post-hole cellar 5 feet deep, to retard development. As soon as the flies emerged, even before their wings expanded, they were attacked and killed by hordes of *Solenopsis molesta* Say.

A successful method of rearing the stable fly.--C. W. Eagleson, of the Dallas laboratory, reports that wild stock of *Stomoxys calcitrans* L. was captured and placed in screen cages 9 cm in diameter and 17 cm long. The cages were set in small pans half filled with water-saturated sand covered with squares of tissue paper. A tissue square was placed on top of each cage and a pad of water-filled cotton placed on it. Besides providing moisture for the flies, the eggs are kept damp, with the result that from 75 to 80 percent of them can be depended on to hatch. The papers are changed daily and the eggs collected and put on larva food medium. The flies are fed twice daily from blood-soaked wads of cotton. A large percentage of the flies fail to find the food pads if the cages are not darkened except for a small area adjacent to the pads. Acidulated blood is kept frozen until feeding time, when a small amount is dug out of the tray and allowed to melt. Blood kept thus for 2 weeks is readily accepted by the flies, even while still ice cold. Females of *S. calcitrans* have been kept for 3 weeks under these conditions and have laid satisfactorily during the entire period. Feeding larger numbers of flies in the large aging cages, a more difficult problem, is not yet solved. Mortality during hot weather is very high if all individuals do not feed at least once a day. In the small cages almost all flies will engorge heavily twice a day. About a dozen different food combinations for the larvae have been tried. To date the most promising is a mixture of crushed oats and fermenting grass hay chopped into 10-cm lengths. Pure oats is not a favorable medium, and growth of the larvae on pure fermented hay seems normal, but exceedingly slow.

FOREIGN PLANT QUARANTINES

Pathological interceptions of interest.--*Ascochyta conorum* P. Henn. was intercepted for the first time on August 10 at New York on spruce cones from Norway in baggage with other coniferous material on the *Queen Mary*. Citrus canker, *Bacterium citri* (Hasse) Jehle, was again intercepted on Japanese oranges on August 8 at New York. *Gloeosporium concentricum* (Grev.) B. and Br. was intercepted at Boston on August 5 on cabbage from England. Our second interception of *Heterodera marioni* (Cornu) Goodey from Chile was made on August 6 at New York in potatoes, and our first interception of this nematode from Poland was made at the same port on August 3 in peony roots. Our first interception of *Leptosphaeria culmicola* (Fr.) Karst. was made on July 19 at New York on wheat stems in baggage. *Mycosphaerella lythracearum* Wolf was intercepted for the first time on July 30 on pomegranate from Mexico at Hidalgo. *Papulospora parasitica* (Eid.) Harz was intercepted for the second time on August 24 on tulips from Holland, at Norfolk. Our first interception of *Pestalozzia guepini* Desm. from Trinidad was made on August 27 on avocado at Baltimore. *Phoma citricarpa* McAlp. was intercepted on lemon from Singapore on August 26 at Boston. The two previous interceptions of black spot on lemon were from Australia and Japan.

Entomological interceptions of interest.--Three pupae of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were found at Philadelphia on June 11 in a drawer containing several oranges from Spain. As the pupae cannot be traced directly to these particular oranges, the percentage of infestation cannot be estimated. Five living larvae of the fruit fly *Anastrepha* sp. were intercepted at New York on June 17 in a mango fruit in a box on the deck of a ship. The trash from waste-paper baskets taken out of the cabins on the ship was being dumped into this box on the deck while a thorough inspection of the ship was in progress. Looking through this material 16 mangoes were discovered. The passengers on this trip were from Aruba, Curacao, Venezuela, and Puerto Rico, so there is no way of definitely placing the origin of the fruit. Careful examination of all the mangoes showed an infestation of fruit fly larvae in only one fruit. Two living larvae of the gypsy moth (*Porthetria dispar* L.) were taken at Seattle, Wash., on June 2 on the foliage of a dwarf maple in baggage from Japan. Living specimens of the scale insect *Lepidosaphes lasianthi* Green arrived at Savannah, Ga., on March 11 on a croton plant in ship's quarters from Singapore, Straits Settlements. A living adult of the scolytid *Stephanoderes nitidipennis* Hopk. was taken at New Orleans on May 8 on a pineapple fruit in cargo from Cuba. A living larva of the weevil *Metamasius* sp. was intercepted at Eagle Pass, Tex., on June 4 in a banana in baggage from Mexico. The larva had tunneled into the fruit, entering through a small hole in the peel. Five living larvae of the tineid *Setomorpha insectella* Fab. arrived at Boston on June 8 in yams in baggage from the Lesser Antilles. Seven living larvae of the pink bollworm (*Pectinophora gossypiella* Saund.) were taken at San Juan, P. R., on February 12 in 2½ ounces of raw cottonseed in passenger's baggage from the Dominican Republic. A living specimen of the anthribid *Phloeobius pallipes* Jord. was intercepted at San Francisco on June 2 in bamboo in baggage from the Philippines. Living specimens of the gladiolus thrips (*Taeniothrips simplex* Morrison) were taken at the airport at Brownsville, Tex., on March 26 on gladiolus in cargo from Mexico. Living adults of the cucujid *Telephanus costaricensis* Nevermann arrived at Baltimore on June 1 with banana debris in cargo from Guatemala. Living larvae of *Epipolaeus caliginosus* Fab. were intercepted at Washington, D. C., on April 24 in hop roots in express from Kent, England. The larvae of this weevil under the name *Plinthus caliginosus* Fab. are recorded as doing much damage to hops in England by tunneling in the roots.

Cashew fruit as host of Anastrepha.--On June 12, 1936, during an inspection of the Livingston Grove, Dorado, P. R., 38 ripe cashew fruits (Anacardium occidentale) were collected from a sandy waste near the seashore adjoining the grapefruit grove. The soft and fleshy fruit-like receptacles of several of the nuts were cut up in thin slices and 5 larvae, apparently of Anastrepha sp., were found, 2 in one receptacle and 1 in each of three others; while from the remaining fruits 4 pupae were obtained, making a total of 9 larvae and pupae, apparently Anastrepha sp., from the 38 fruits. Two adults reared from the pupae proved to be Anastrepha acidusa. This is the first record of the infestation of cashew by Anastrepha in Puerto Rico. From a subsequent collection of 46 ripe cashew fruits from the same place on July 3, 1936, three pupae were obtained which have given 3 adults, apparently of the same species. Hicacos (Chrysobalanus icaco and C. pellocarpus) found in abundance in the same part of the sandy waste were not infested, but 49 ripe almendras found in another part of the grove on June 12 and 88 more found on July 3 were not infested.

Large number of Medfly larvae intercepted in Hawaiian mango.--A well-matured mango of Hawaiian origin intercepted in a waste-basket in a stateroom during room inspection of the S. S. Lurline arriving at San Francisco on July 31 from the Hawaiian Islands was found on examination to contain an unusually large number of Medfly larvae in all stages of development. An exact count was not made, owing to lack of time, but the number was estimated at well over one hundred. The fruit was broken open under water in the galley of the ship and 62 larvae (counted later) floated out and were placed in alcohol for laboratory examination. The inspector handling the interception stated that he noted an equal number of larvae floating on the surface of the water during the process of destroying the fruit by boiling. A second mango of Hawaiian origin was found on the same vessel in a crew's locker which, in addition to 15 Medfly larvae, contained a larva of the mango seed weevil (Sternochetus mangiferae F.) in the seed. Prohibited fruits, whether infested or not, are destroyed on board by cooking or boiling.

DOMESTIC PLANT QUARANTINES

CHARLES W. LEWIS

Charles W. Lewis, who had been an employee of the United States Department of Agriculture for more than 18 years, died in New York City on August 19. During the past several years Mr. Lewis had been assigned by the Japanese beetle project to transit inspection work in Philadelphia. About two weeks prior to his death, Mr. Lewis had been transferred to carry on similar work in New York City. Funeral services were held on August 23 at Melrose, Mass.

Public hearing on peach mosaic disease quarantine.--Notice that a public hearing would be held on September 14 at Washington, D. C., to consider the advisability of quarantining the States of California, Colorado, New Mexico, Texas, and Utah on account of the peach mosaic disease was issued on August 19. It has since been found desirable to extend the scope of the hearing to include the State of Arizona where the disease was recently found in a preliminary survey, and to hold the hearing on September 21, at Albuquerque, N. Mex. The change has therefore been made for the convenience of those in the infected States who may desire to attend the hearing. Peach mosaic, the newest of the peach virus diseases, is recognized as of serious economic importance. The natural local spread is extremely rapid and may result in infection of an entire orchard in a few years. Recent surveys made cooperatively with the States concerned resulted in finding the disease in eight counties along the Rio Grande drainage area in New Mexico, a second county in Utah, two more counties in Colorado, and nine more in Texas. It was also reported in three counties in California. Last year the disease was known to exist in only 1 county each in Colorado and Utah, and 10 counties in Texas. While no regular appropriation is allotted for Department activities in the control of the disease, an allotment of $25,000 has recently been received from emergency funds for inspection and eradication. The eradication work now under way in California, Colorado, Texas, and Utah will be extended, with the cooperation of State plant pest control officials, to all the infected States.

Phony peach disease found in Indiana and Pennsylvania.--Surveys for the phony peach disease in States north of the region of known infestation have been completed in Ohio, Indiana, and Pennsylvania, with the assistance of State inspectors, and have resulted in the discovery of one infected tree each in Gibson County, Ind., and Berks County, Pa., the latter the most northern point the disease has been found. The survey is to include the peach-growing areas in Virginia, West Virginia, Maryland, Delaware, and New Jersey. Inspections are also under way in 12 southeastern States where the disease is known to exist, the work covering commercial and home orchards, and the environs of nurseries. The work of relief laborers in removing over 42,000,000 worthless peach trees from 212 counties in the infected States during the year is an important supplement to the inspection activities.

Recurrent citrus canker in Galveston, Tex., district.--Several of the properties in Galveston, Brazoria, and Harris Counties, where citrus canker was found last year in an intensive campaign of inspection, and which have been repeatedly inspected in the intervening months, are showing canker on small seedlings. All properties from which citrus plants have been removed under the eradication program are now being reworked for the purpose of removing all seedlings. A close inspection is being made of the entire section in an effort to examine every citrus tree, and all abandoned and escaped trees are being destroyed in the course of inspection. Several other counties in the vicinity are also being inspected, particularly the properties found infected with canker in earlier years, but no further cases of the disease have been found. In the lower Rio Grande Valley, continuous inspection is carried on as a separate and distinct unit. In the past fiscal year the work covered 2,400 grove and nursery properties, principally in Hidalgo County, with special attention given to abandoned citrus trees. A tree-to-tree examination made of all properties that showed canker in earlier years, resulted in finding that the lower Rio Grande Valley is apparently still free from citrus canker.

Transit-inspection results.--More than 2,300 shipments moving in violation of Federal domestic plant quarantines were intercepted by transit inspectors at 21 stations in the fiscal year 1936, an increase of more than 400 over that of the previous year. These results are due in part to an increase of the inspection force and to the extension of the work to several cities in which the inspection of mail, express, and freight had not been carried on theretofore. Several of the States are cooperating in the work.

CONTROL INVESTIGATIONS

Tropical plants tested as insecticides.--Tests to determine the toxicity of numerous plants and plant products grown in Puerto Rico and other tropical countries are under way, in cooperation with the Bureau of Plant Industry. Over 200 samples have been submitted for testing on mosquito larvae, flies, and leaf-eating insects, and many of the samples have been found to be decidedly toxic. W. N. Sullivan, Beltsville, Md., is carrying on the tests on flies and mosquito larvae.

INSECTICIDE INVESTIGATIONS

New synthetic organic insecticides.--The Division of Insecticide Investigations has synthesized a large number of organic compounds that have been tested by the Division of Control Investigations for their toxicity to mosquito larvae, convenient test insects, in a search for organic insecticides to replace inorganic insecticides that may be hazardous to human health. These compounds are tested by dissolving them in acetone and adding calculated portions of the solution to beakers containing 100 cc of water and 50 mosquito larvae entering the fourth stage. Those concentrations of the various compounds that produced a mortality of 50 percent or higher in 16 hours were considered effective. Some of the most toxic compounds found are: 4-(p-bromophenylazo)-o-cresol, 4-(p-bromophenylazo)-resorcinol, p-bromphenylazophenol, 4-(p-bromophenylazo)-m-cresol, 4-(2.5-dichlorophenylazo)-o-cresol, 6-methylphenothiazine, and phenothioxin. These compounds were synthesized by D. L. Vivian and L. E. Smith of the Division of Insecticide Investigations and were tested on mosquito larvae by D. E. Fink, of the Division of Control Investigations. Notes describing the results of these tests appear in the Journal of Economic Entomology for August 1936.

Bibliography of nicotine.--In 1933 the Division of Insecticide Investigations, in cooperation with the Division of Control Investigations, began abstracting all the literature relating to nicotine. On account of the great number (over 5,000) of articles on nicotine, it was decided to compile abstracts of these in groups according to subject. All references to the literature dealing primarily with the chemistry of nicotine have just been published in mimeographed form under the authorship of R. L. Busbey and N. E. McIndoo as circular E-384. This publication of 257 pages contains 851 abstracts of articles on the physical and chemical properties of nicotine, methods for the determination of nicotine, processes for the extraction of nicotine from tobacco, and the occurrence of nicotine in various species of Nicotiana. An author index and a subject index refer to the abstracts by number. In the introduction to the publication the authors state: "The annual consumption of nicotine as an insecticide in the United States is estimated to be 1,000,000 pounds of the alkaloid, equivalent to

2,500,000 pounds of the ordinary commercial 40-percent solution. Extensive tests by workers in the United States Department of Agriculture and in certain of the State agricultural experiment stations and also by insecticide manufacturers are now under way to find new uses for nicotine and better ways of applying it. In order to assist these investigators a comprehensive bibliography, dealing with all phases of nicotine, has been prepared. On account of the voluminous literature on the subject (over 5,000 references) it was decided to issue the bibliography in sections--one dealing with the chemistry, one with the pharmacology, and one with the use of nicotine as an insecticide. The present publication comprises as far as possible all references to published papers that appeared prior to 1935 and which are of interest primarily from the chemical point of view. Articles which may contain some reference to the chemistry of nicotine but which are chiefly entomological or medical will appear in the appropriate section. To facilitate finding the references relating to any particular phase of the subject, they have been grouped under headings as shown in the table of contents. The arrangement under these headings is chronological by years and alphabetical by authors for each year."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

The taxonomy of the coconut hispids of the genus Brontispa.--Several specimens of the hispid genus Brontispa, reported as a serious pest of coconut in certain of the Pacific islands, have been received from O. H. Swezey, Guam. An attempt by H. S. Barber to identify these involved the study of all available material in the group, as well as the careful examination of nearly 50 widely scattered papers dealing with the various species falling in the Brontispa complex, which are exceedingly injurious in coconut culture. This mass of literature indicates that the taxonomy of the group is very confused. Five different generic names have been used for the several species involved and the specific names have been so misapplied that only a few of the more distinct forms are recognizable as correctly identified. The fact that the types of most of the species are scattered in various European collections adds to the difficulty of proper classification. Nevertheless only a thorough review of the whole situation can make possible the definite establishment of the identity of any given material in this group. This condition is characteristic of numerous taxonomic problems in all the larger orders of insects and emphasizes the desirability of increased opportunity for taxonomic research.

European chalcid parasite of Bruchus brachialis F. in the United States.--Several specimens reared from B. brachialis in vetch seed taken at Salisbury, N. C., were recently submitted by C. C. Hill, of the Division of Cereal and Forage Insect Investigations. They have been identified by A. B. Gahan as Bruchobius mayri Masi and represent the first record of the occurrence of this species in North America.

A new parasite of the coffee leaf miner.--Recently Francisco Sein, Jr., of the University of Puerto Rico at Rio Piedras, submitted for determination a series of 50 specimens of a braconid reared from larvae of the coffee leaf miner (Leucoptera coffeella Staint.) in Guadeloupe. The parasite has been identified by C. F. W. Muesebeck as a new species of Mirax, a genus of Microgasterinae. Species of this genus have been known as parasites of lepidopterous leaf miners but have never before been reared in sufficient numbers to indicate that they may be of importance as control agents. This species from the coffee leaf miner in Guadeloupe, however, occurred so abundantly as to suggest that it may prove an important factor in the control of that insect.

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FRUIT INSECT INVESTIGATIONS

Distribution of insects in a raisin stack.--H. C. Donohoe, of the Fresno, Calif., laboratory, obtained information, by sampling the fruit, on the distribution of several species of insects in a stack of boxes of raisins. The dominant species was the raisin moth (Ephestia figulilella Greg.). Alternate boxes of raisins were sampled across the face of a stack that was being dismantled. The cross section of closely piled boxes was about 13½ feet high by 18 feet wide. The raisins had been harvested and stacked in an open-sided shed in the fall of 1935 and the samples were taken on February 25, 1936. The data obtained showed a concentration of larvae of the raisin moth in the lower part of the stack, a condition found in a similar sampling of raisins of the crop of 1934. A less-marked tendency of the insects to concentrate in the outside vertical tiers of boxes was indicated. Other collections from the outside of boxes, from beneath movable foundation timbers, and from soil under the stack showed the presence of about 13,100 larvae of the raisin moth, 172 larvae of the Indian-meal moth (Plodia interpunctella Hbn.), and 277 adults of the saw-toothed grain beetle (Oryzaephilus surinamensis L.) per ton of raisins. Of the first species, 7,600 were living and 5,500 were dead larvae.

Small darkling beetles controlled by use of poisoned-bran mash.--C. K. Fisher, of the Fresno laboratory, reports that during the summer of 1936 beetles, Blapstinus rufipes Casey, were seriously injuring young replanted grapevines in a vineyard near Fresno, as many as 10 beetles feeding on single vines. Because the beetles were very active and scattered rapidly when disturbed and also because some were concealed under the soil, more beetles than were counted may have been congregated around some vines. Damage was apparent by the feeding on young leaves and buds, some of the small leaves and buds being practically all consumed. After preliminary laboratory tests with poisoned-bran mash made approximately according to the formula for grasshopper poison (100 pounds wheat bran, 1 quart of liquid sodium arsenite, and 14 gallons of water), which gave promise of control, this material was tried as a means of control in the vineyard. Instead of commercial liquid sodium arsenite, a 46-percent solution was made with dry sodium arsenite. The poisoned-bran mash was applied between 6:30 and 7:50 p.m. by dropping a small handful around each infested vine in four rows in the vineyard. It appeared that the mash was still fed upon and effective after it had become quite dry. Observations made 48 hours after the application of the bait showed some beetles dead and a few alive, but 9 days after the application observations showed as high as 24 beetles dead around a single plant, with none alive in the vicinity of the plants treated. From 7 to 10 dead beetles around a plant were frequently seen. An occasional living beetle was observed between the rows. Plants receiving no mash showed living beetles and none dead.

Little fire ant troublesome in southern Florida.--The little fire ant (Wasmannia auropunctata (Rodger)) was recorded from southern Florida in 1929 by M. R. Smith, and the same year W. M. Wheeler reported that he had received specimens of this ant from Florida some 5 years earlier. This ant is known from parts of South America, Mexico, and the West Indies and its range out of doors is not considered to extend beyond the subtropics. It does occur, however, in greenhouses at Kew Gardens, England. The species is found in Puerto Rico associated with certain scales and mealybugs in coffee plantations. Recently the little fire ant has been reported as becoming a serious problem in certain districts in southern Florida, particularly in citrus groves.

Flight of peach borer moths.--O. I. Snapp, Fort Valley, Ga., writes that when female peach borer moths are released in a cotton field or a pasture they invariably return to the point of release after making a flight. This habit was observed by Mr. Snapp and J. R. Thomson, Jr., in other years in peach orchards. Female moths were found to deposit most of their eggs on the tree in which they originated. One moth repeated the return flight twice at a distance of 85 yards from the point of liberation. From these observations, the conclusion is made that the female moths apparently have no definite direction of flight and that they are not attracted to nearby peach orchards when released in cotton fields, even though there is a peach orchard in only one direction from the place of liberation.

Delayed control of San Jose scale from liquid lime-sulphur.--The Fort Valley laboratory reports that the degree of control of the San Jose scale from liquid lime-sulphur was found this year to increase between the fourth and sixth month after spraying. The results of the 1935 experiments indicated that the degree of control of the San Jose scale from liquid lime-sulphur increased between the first and fifth month after spraying, and that scale counts made 1 month after spraying are entirely too soon after the material is applied to give dependable determinations of its efficiency as an insecticide for that insect.

Release of Japanese beetle parasite in New Hampshire.--I. M. Hawley, Springfield, Mass., reports that on August 17, 1936, 400 females and 494 males of Centeter cinerea Ald. were liberated at Keene, N. H. This imported dipterous parasite of the Japanese beetle is feebly established in the Moorestown, N. J., district. The flies released at Keene emerged from puparia from parasitized beetles collected at Moorestown in 1935 and held in storage so as to retard development of the flies to meet New Hampshire conditions. Parasitized beetles were recovered soon after the release of the flies on August 24, September 8, and September 15.

Possible 2-year life cycle of Japanese beetle parasite.--M. H. Brunson, of the Moorestown laboratory, reports on the possibility of Tiphia popilliavora Roh. having a 2-year life cycle. In 1935 data were obtained which indicated that possibly T. popilliavora has a tendency toward a 2-year life cycle. Emergence was obtained in 1935 from cocoons carried over from 1933. This year emergence was obtained from cocoons 2 years old and in one instance 3 years old. These cocoons were handled in the usual way, the cocoons being held in a cellar at the average temperature of the soil at a depth of 3 inches throughout the year and cocoons not producing adults were held over the following year. The results are as follows: In 1933 cocoons were obtained from field-collected females. These cocoons were held at the usual temperature for adult emergence in 1934, 1935, and 1936. Adults emerged in 1934 and 1935, and this year, after a period of 3 years, four males emerged from these cocoons. The cocoons are being held for emergence in 1937. In 1934 cocoons obtained as a product of various observations in the insectary were handled in the usual way for adult emergence in 1935. A total of 482 cocoons not producing adults were carried over winter and handled in the usual way for adult emergence this year. From the 482 cocoons, 11 male and 4 female T. popilliavora emerged. These results may be considered as further evidence that T. popilliavora may remain in cocoons for 2 years before emerging as adults. However, this tendency toward a 2-year life cycle may not represent the normal reaction of the insect to conditions as they occur in the field, but may be a reaction to slightly abnormal temperature and humidity conditions as they occur in the cellars used to retain the cocoons.

MEXICAN FRUIT FLY CONTROL

Shipment of citrus fruit from lower Rio Grande Valley to start soon.-- A few days before the end of September announcement was made by the Texas Commissioner of Agriculture that tests for citrus maturity would be made commencing October 1. Practically all of the packing houses are in readiness to begin shipments and it is expected that regular movement of citrus fruit will start soon after the first of the month. The usual heavy September rains have seriously retarded field operations. In many instances it was impossible to reach the groves where traps were located and as a result the number of specimens submitted for identification was unusually low. During this period no Anastrepha ludens Loew were trapped, and only 5 A. serpentina Wied., and 105 A. pallens Coq. were taken.

CEREAL AND FORAGE INSECT INVESTIGATIONS

New parasite of vetch bruchid.--J. S. Pinckney, of the Carlisle, Pa., laboratory, reports having reared the hymenopterous parasite Lariophagus distinguendus (Forst) from Bruchus brachialis Fahr. This parasite has not been previously listed as attacking this species. He has also reared from this pest for the first time in this country the European parasite Bruchobius mayri (Masi).

European corn borer infestation per plant and rate of survival.--L. H. Patch and G. T. Bottger, Toledo, Ohio, report as follows on the number of borers per plant and rate of borer survival according to planting date and strain of corn: Of two strains of hybrid field corn R4 x Hy and A x Tr, of approximately the same silking date, the former was shown to be relatively resistant and the latter relatively susceptible to European corn borer infestation. A series of 10 successive plantings of both strains, from May 7 to June 5, was made in 1936, near Toledo. A sample of plants of each strain was examined in each planting during the season to determine natural egg deposition. The total number of egg masses received by each strain was approximately the same, namely, 780 and 738 by R4 x Hy and A x Tr, respectively. The number of eggs received per planting, however, decreases with later planting, the plantings of May 26 and May 29 receiving approximately half the number laid on the plantings of May 7 and May 11, when either strain is considered. On the other hand the resultant borers in the later plantings were approximately only one-third the number recovered from the earlier plantings, indicating a lower rate of survival in the later plantings. The percentage of survival was reduced from 9.9 to 6.9 percent for A x Tr and from 4.9 to 3.1 percent for R4 x Hy by planting on an average of 19 days later. With regard to strain results, although both strains received approximately the same number of eggs, only half as many borers were dissected from R4 x Hy as from A x Tr, indicating that the survival rate in R4 x Hy was approximately half the survival rate in A x Tr. Since the strains differ in time of silking by only 1 day, it may be concluded that R4 x Hy possesses some inherent factor which contributes to resistance to borer establishment, a factor not present in the hybrid A x Tr. The results discussed above, obtained under conditions of natural infestation, substantiate the selection of borer-resistant and borer-susceptible strains on the basis of uniformly hand infesting the plants with egg masses produced by laboratory methods, which overcomes dependency on heavy natural infestations. Similar results were obtained in 1936, and in previous years, when infestation of the plants was induced by hand methods.

European corn borer in Lake States.--According to A. M. Vance, Toledo, current information on European corn borer abundance in the Lake States was obtained in a survey of 1,388 cornfields, segregated in county or county-group units, conducted during the period August 10 to September 19. The following facts were determined from the survey: (1) A definite decrease in infestation in 1936, as compared with 1935, occurred in eastern Indiana, in the lower two-thirds of the section surveyed in the western half of Ohio, and in the "thumb" section of Michigan. (2) Borer populations in the northwestern corner of Ohio and the southeastern part of Michigan, west of Lake Erie, were at least as abundant in 1936 as in 1935, with significant increases appearing in 11 of the 23 counties comprising the entire section. (3) Corn borer abundance in 1936 remained at the relatively low level of 1935 in counties bordering the Lakes in western New York, and in Centre County, Pa. (4) The corn borer was found to be present in negligible numbers in central Indiana and in the southwestern corner of Michigan. In central Michigan, however, the insect was as abundant as in the older eastern infested counties of the State. Drought again appears to have been chiefly responsible for checking the corn borer in western New York and in a large westerly part of the infested territory in Michigan, Ohio, and Indiana. However, including the reduction of borer populations in the southern two-thirds of surveyed Ohio and in the "thumb" of Michigan, the average number of borers per 100 plants for all comparable counties and county groups in the two States increased in Ohio from 36.8 in 1935 to 50.6 in 1936 and in Michigan from 45.7 in 1935 to 57.8 in 1936.

European corn borer in Eastern States.--Mr. Vance also reports that in a similar survey of 760 cornfields in the Eastern States during September the following facts were determined: (1) Significant increases in borer abundance, from 1935 to 1936, appeared in southwestern Vermont, central Massachusetts, eastern Connecticut, Rhode Island west of Narragansett Bay, and in Monmouth County, N. J. (2) With the exceptions of Essex and Bristol Counties, Mass. , where populations of the borer remained about the same in 1936 as in 1935, there was a lower infestation this year than in 1935 along the Atlantic coast from York County, Maine, to and including Bristol and Newport Counties, R. I. (3) Borer populations, in 1936, in northwestern Vermont, in Hartford and New Haven Counties, Conn., and in the Atlantic-Burlington-Ocean County group in New Jersey, remained at the approximate levels of 1935. (4) In Middlesex County, Conn., and on Long Island and the Eastern Shore of Maryland and Virginia, there occurred definite decreases in the abundance of the insect from 1935 to 1936. (5) The heaviest concentrations of the borer continued to be in southern New England and Long Island, N. Y., with only a light infestation appearing in Maine and New Hampshire in 1936. (6) Borer infestation was found in several cornfields in Sussex County, Del., in 1936, where a fall-infestation survey was conducted for the first time.

European corn borer on Virginia mainland.--Mr. Vance reports a first record of the European corn borer on the mainland of Virginia, made by H. G. Walker, of the Virginia Truck Experiment Station at Norfolk. Dr. Walker collected 18 borer larvae in Princess Anne County, Va., on August 28, 1936, which have been determined by Carl Heinrich as Pyrausta nubilalis Hbn.

JAPANESE BEETLE CONTROL

Japanese beetle scouting concluded for season.--Late-season nursery and greenhouse scouting in northern New York and Connecticut was concluded on September 12 and the crews working in the other New England States were dismissed on September 19. Trucks and other equipment used by the crews in New York and Connecticut were returned to the New Cumberland, Pa., warehouse. Trucks used by five New England crews were temporarily stored at Greenfield, Mass., for later use in connection with bough and Christmas tree inspection work. Japanese beetles were found on the premises of 19 classified nurseries and greenhouses in New England and within 500 feet of 4 other nurseries.

Violator of Missouri State quarantine prosecuted.--Acting on evidence obtained by O. K. Courtney, the division's representative in St. Louis, the Missouri Department of Agriculture entered a complaint against J. T. White of St. Louis for a violation of Missouri Intrastate Quarantine No. 1 on the Japanese beetle. The charge involved transportation of a truckload of dirt from a location in the St. Louis quarantined area to a dump near the Mississippi River. The defendant was hailed before the St. Louis Court of

Criminal Correction on September 15 and, after entering a plea of guilty, was fined $25 with a stay of execution for good behavior. The good-behavior requirement included return of the dirt to the quarantined zone.

Fruits and vegetables quarantine lifted.--With the near-disappearance of the adult Japanese beetle, as evidenced by freedom from infestation of farm products offered for inspection, it became possible on and after September 22 to lift the restrictions on the movement of fruits and vegetables. Certification requirements for cut flowers will be maintained until October 15, since the few beetles still in the field are largely found deep in the blooms of outdoor-grown flowers, many of which are still being offered for inspection. Lifting of the seasonal quarantine resulted in the dismissal of approximately 60 inspectors who had been assigned to this activity.

Inspection demands in Pittsburgh.--There was a considerable increase in cut-flower inspections during September, as compared with the previous month, the number of individual inspections increasing from about 20 to approximately 45 per day. The October outlook is even better than September's. Fruit and vegetable inspection, however, decreased during September, owing to the maturing of home gardens and locally grown crops. A number of large palms, ferns, and rubber plants have been made soil-free and have been repotted in certified soil preparatory to being placed in certified greenhouses where they are "boarded" for individual owners during the winter.

Japanese beetle quarantine violator fined.--In the first prosecution ever instituted in a nonregulated Southern State for a violation of the Japanese beetle quarantine regulations, Earl Davis, of Knoxville, Tenn., was fined $25 for the transportation to Knoxville on June 20 and July 9, 1936, of uncertified farm products from Norfolk, Va., and Baltimore, Md., respectively. The defendant was arraigned in the United States District Court in Greeneville, Tenn., on September 21, at which time he entered a plea of guilty. Both of the interceptions were made by road inspectors stationed on highways leading from the regulated area.

Motor-driven debeetler speeds inspection.--An electric motor installed on one of the new bean machines located at Berlin, Md., has increased the capacity of the machine from 109 to 180 bushels per hour. The riddling cylinder is driven at 45 revolutions per minute. At this inspection center the beans were packed in bushel baskets and the baskets moved on rollers to the car. With this arrangement, a car of string beans may be run through the machine, packed, and loaded in approximately 3½ hours.

North Carolina official assigned to Japanese beetle work.--A conference was recently held by field representatives of the Bureau with R. W. Leiby and J. Thomas Page, concerning enforcement of the North Carolina Japanese beetle quarantine regulations. Mr. Page has been designated as enforcement officer for the State order.

Egg clusters removed from inspected products.--Among the hundreds of shipments inspected during this period, 13 were found to contain gypsy moth infestation. From 11 consignments of forest products and 2 lots of nursery stock there were removed prior to certification 36 egg masses and 2 pupae of the gypsy moth. One of these clusters was taken from a shipment of 15 evergreens that were to be used as samples by a salesman working outside the infested zone. Ten of the egg clusters were removed from a carload of shims inspected at Deering Junction, Maine, for transportation to a nonregulated portion of the same State. Five more egg masses were found on car stakes destined from Conway, N. H., to Jersey City, N. J.

Corn borer infestation conditions in New Jersey.--Occasional inspections have been made of corn fields in Mercer County and vicinity, with the result that considerable corn borer infestation has been found. In the vicinity of Cranbury several heavily infested fields were located. Many of the hills in these fields were broken over, owing to the borer. Examination of both stalks and ears disclosed as many as five borers per ear, with an average stalk infestation of three borers. Reports for other sections of the State indicate that the borer has increased considerably and that scouting would probably have disclosed many new infestations. This increase in borer population has added to the inspection activities involved in the certification under State corn borer quarantines of chrysanthemums, dahlias, and asters grown in the infested sections.

Dutch elm disease infection at Branford, Conn.--One of the most outstanding single infection discoveries of this season involves a 6-inch elm at Branford, New Haven County, Conn. This location is approximately half way between the major infected zone in Fairfield County and the isolated point where four confirmed trees were found at Old Lyme. Discovery of this tree is the first indication that the disease exists in the intervening stretch of approximately 55 miles between the two areas. This tree exhibits discoloration in annual rings prior to 1936, indicating the probability that the fungus entered the tree several years ago. A preliminary elm census in the adjoining territory shows approximately 26,000 elms within a 5-mile radius of the confirmed tree. Of this census, over half the elms are within a 1-mile radius. Within this mile radius there are between 3,000 and 4,000 dead or more-than-half-dead elms, in some of which engravings of Hylurgopinus rufipes Eich. were found.

Isolated Dutch elm disease infection found.--Confirmation was received during this period covering a tree within 50 feet of the Baltimore & Ohio Railroad tracks near Cumberland, Md. Cumberland is 66 miles west of the Brunswick, Md., infection and 114 miles west of Baltimore, where an infection was previously discovered. Another infected tree was discovered in Hopewell Township, Mercer County, N. J., necessitating a further extension of the major infected zone.

Systematic scouting nearing completion.--Autumnal yellowing of elm foliage will soon force discontinuance of scouting for Dutch elm disease infected trees. During the biweekly period ending September 26 there were reported 451 confirmations.

FOREST INSECT INVESTIGATIONS

Fort Collins laboratory in new quarters.--J. A. Beal, of the Fort Collins, Colo., laboratory, reports that with the completion of the Forestry Building early in September, on the Colorado State College campus, the laboratory was moved from the Administration Building to the second floor of the Forestry Building. This is a modern, two-story structure which now houses the Forestry School, the Rocky Mountain Forest and Range Experiment Station, and the Forest Insect Laboratory. The laboratory personnel occupies three office rooms and has the joint use of a large laboratory room with the experiment station. The new address is 210 Forestry Building.

Black Hills beetle increasing on Elk Mountain.--According to J. M. Whiteside, of the Fort Collins laboratory, infestation by Dendroctonus ponderosae Hopk. on the Elk Mountain area in southern Wyoming has increased rapidly since 1934. The following data on a typical 8-acre strip plot, ranging in elevation from 7,800 to 10,000 feet and covered with an even mixture of lodgepole pine and limber pine, indicate the peculiarities and general trend of this epidemic.

Host tree	Attacks in--		
	1934	1935	1936
	Number	Number	Number
Limber pine-----	26	85	278
Lodgepole pine--	17	40	45
Total-------	43	125	323

Based on the total number of trees attacked this infestation has increased at the rate of about 300 percent each year, although a decided preference for limber pine is noted. The trend of the epidemic in direction is toward the top of the mountain. Most of the trees attacked in 1934 were found between 8,000 and 9,000 feet elevation. Practically all of the 1935 trees were above 9,000 feet. In 1936 about 85 percent of the attacks were above 9,500 feet, most of them being about 10,000 feet. Since the available host material around 10,000 feet is very limited, it will be interesting to know where the beetles will go following the 1937 emergence.

Successful control project against Black Hills beetle.--Mr. Beal also reports that the serious outbreak of this beetle, which has resulted in the loss of some forty million board feet of ponderosa pine timber on the Montezuma National Forest during the last 5 years, has now been successfully brought under control. The control campaign initiated by the United States Forest Service in 1933 and continued up to the present time, has so reduced the bark beetle population that it is now extremely difficult to find even an occasional infested tree. However, on parts of the forest hundreds of large, old, dead "bug trees" still stand as indicators of the severity of this outbreak prior to the beginning of control work. During the treating work about 20,000 trees averaging 1,000 board feet each were removed and destroyed. It is believed that an equal volume of timber was lost preceding and during control operations. The success of this bark beetle-control project, starting after the outbreak had gained considerable headway indicates the degree of success we may expect in protecting the ponderosa pine stands of the Rocky Mountain region from future bark beetle outbreaks.

Ambrosia beetles attack fire-killed Douglas fir in Oregon.--A complex association of insect species contribute to the deterioration of fire-killed Douglas fir, but only a few cause destruction of the heartwood and hence are important factors to consider in salvage logging, according to R. L. Furniss of the Portland, Oreg., laboratory. Platypus wilsoni Sw. is a recent addition to the list of destructive species. During August and September of the current year, this insect began attacking numerous dead firs in the fog belt near Foss, Oreg. P. wilsoni normally attacks weakened, windthrown, or fire-killed western hemlock along the North Pacific coast. Douglas fir is only occasionally attacked and the present case is the only example of damage noted in the examination of some 60 burned areas.

Pine beetle damage moderates in Pacific Northwest.--F. P. Keen, of the Portland laboratory, reports that a marked reduction of western pine beetle damage in ponderosa pine in Oregon is evident from the preliminary results of this year's survey. Five three-man crews have checked nearly 3,000,000 acres for beetle damage and only a few areas show aggressive epidemic losses for this year.

Smaller European elm bark beetle found in West Virginia and Ohio.--Scolytus multistriatus Marsh. was recently found to be established in Parkersburg, W. Va., by the Bureau's Dutch elm disease eradication unit. C. H. Hoffman, of the Morristown, N. J., laboratory, spent the latter part of September scouting in the country surrounding Parkersburg to determine the limits of the infested area. By the end of September the species had been found over an area approximately 100 miles in diameter and covering parts of West Virginia and Ohio. The beetle had previously not been reported from either State.

Does 17-year Cicada transmit Dutch elm disease?--During 1936 the 17-year locust was abundant at certain points in New Jersey. Because of the oviposition punctures the females make in the twigs and small branches of various trees, including elm, it was thought that they might act as transmitters of the Dutch elm disease fungus. During the latter part of June adults were collected at Trenton, N. J. They were placed in an outdoor cage at the Morristown, N. J., laboratory. Freshly cut branches of an elm affected with the disease were placed in the cage. Fifty-three females found ovipositing in the branches were removed immediately after each had inserted most of the ovipositor into the wood. The ovipositors were removed from these females and cultured by the Division of Forest Pathology, Bureau of Plant Industry. The fungus was not recovered from any of the ovipositors. Eight samples of the branches were later cut and submitted for culturing. Although the branches were very dry at the time, the fungus was obtained from four of the samples.

Defoliation by hemlock looper.--J. V. Schaffner, Jr., of the New Haven, Conn., laboratory, reports on the effect of defoliation of hemlocks at Warwick, Mass., by Ellopia athasaria Walk. Sixty trees were numbered in

1934 and their condition was recorded as good. The DBH measurements ranged from 4 to 12 inches, with an average of 8.5 inches. In 1934 defoliation ranged from 70 to 100 percent and in 1935 the average defoliation was approximately 90 percent. In 1935, 45 trees were recorded as fair, 8 as poor, and 7 as dead. In 1936, 39 were fair, 12 were poor, and 9 were dead. Greatest mortality occurred in the dominant and codominant crown classes. None of the suppressed trees died.

Mortality of forest tent caterpillar.--Mr. Schaffner reports that 1,348 full-grown larvae and cocoons of *Malacosoma disstria* Hbn. were collected late in June in nine heavily infested localities in Vermont to obtain data on parasitization and moth issuance. The data have been summarized recently with results as follows: Total number of moths issued, 441, or 32.7 percent; number parasitized by tachinids, 248 and by Hymenoptera, 125, or 27.7 percent; mortality by wilt disease and unknown causes 534, or 39.6 percent. A total of 273 maggots, probably all sarcophagids, which are considered as scavengers and not parasitic, issued from those listed as dead from disease and unknown causes.

Liberation of spruce sawfly parasites.--P. B. Dowden and P. A. Berry, of the New Haven laboratory, report as follows on parasite investigations for the month: "On September 4 a shipment of 200,000 *Microplectron fuscipennis* Zett., and on September 23 a shipment of 100,000 of the same species, were received from the Canadian parasite laboratory at Belleville, Ontario, for liberation against the spruce sawfly *Diprion polytomum* Htg. The shipment of September 4 was liberated by the Maine Forest Service at five localities in northwestern Maine. The shipment of September 24 was liberated from New Haven at the following points: Petersham, Mass., 40,000; Orange, Conn., 30,000; Kent, Conn., 30,000.

Tests of sprays for spruce sawfly.--S. F. Potts, New Haven, reports as follows on the control of the European spruce sawfly: "Final observations on sprayed plots show excellent control by derris residue, derris, lead arsenate, calcium arsenate, and lime sulphur. Poor control resulted from nicotine in any form, pyrethrum, bordeaux mixture, and phenothiazine."

Experiments with sprays for use with autogiro.--Mr. Potts also reports on observations continued on hand-sprayed plots with various mixtures to be tested later in autogiro-spraying experiments. The observations show that excellent atomization is possible and that the adherence of the autogiro mixtures is greater than the adherence of mixtures ordinarily used in ground spray work. Lead arsenate, calcium arsenate, derris, derris residue, pyrethrum, rotenone, nicotine tannate, bordeaux mixture, and lime sulphur were prepared successfully as autogiro mixtures.

Lodgepole pine killed by mountain pine beetle on Kootenai Forest.--W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, reports that an infestation of the mountain pine beetle, which since 1924 has been killing lodgepole pine trees in the South Fork of the Yaak River on the Kootenai National Forest, has now destroyed nearly all of the lodgepole pine timber in that area. This timber stand was an important watershed protection, primarily because fires have destroyed much of the timber in the North Fork section. This leaves the headwaters of this river with very little cover to control the run-off from the large area which it drains.

Forest-insect exhibit at county fair.--J. C. Evenden reports that during September the Coeur d'Alene laboratory, in compliance with the request of the Kootenai County Fair Association, presented an instructive exhibit which was received with very favorable comment by the thousands of spectators. The booth featured local forest-insect pests, showing their work, habits, and control, by means of fresh material, photographs, and descriptive placards. Visitors were attracted by a large glass tube filled with living mountain pine beetles and by logs with some of the bark removed to demonstrate the work of the different species of bark beetles.

PLANT DISEASE CONTROL

Barberry eradication.--During the past year field tests have been conducted in Colorado to determine the most practical means of killing Berberis fendleri, a native species of barberry found in the grain-growing areas of the southwestern part of the State. Among the several chemicals tried, Atlacide applied as a spray and soil drench has proved very effective. Twenty relief laborers are now operating knapsack sprayers, using 8 pounds of Atlacide in 5 gallons of water on plots 1 rod square where the barberries are growing in large patches. There is also indication that from 30 to 40 pounds of salt in solution, when applied to plots 1 rod square, will give a satisfactory kill. Promising results have been obtained in the use of diesel oil in connection with the eradication of Berberis canadensis in southwestern Virginia. Oil was applied in quantities ranging from 2 to 15 gallons per plot of 40 square feet. Bushes on one series of plots were cut off, while those on another series were left standing. One-hundred-percent kills were obtained on all plots. All barberry seeds found in the soil on the plots treated with oil were observed to be completely decayed. The seeds could be easily crumbled between the thumb and finger. It appears that the oil penetrates the seed coat, destroying the embryo. It is estimated that the damage to wheat from stem rust in the San Juan basin in southwestern Colorado amounted to 15 percent this year, whereas in the irrigated sections along the eastern slope of the Rocky Mountains only a trace of rust occurred. Harry Atwood, in charge of barberry eradication in Ohio, reports that since August 1, 1935, laborers employed with emergency funds have made possible the eradication of 260,000 barberry bushes on more than 7,200 square miles in 30 counties. The area covered consisted of waste and wooded lands along river banks, fence rows, and woodlots in cultivated areas, and city properties. The expansion of the work with emergency funds has made it possible to bring under control many of the larger areas of infestation in Ohio. Since August 1935 laborers employed with emergency funds in Nebraska have made an inspection of more than 8,000 square miles for barberry bushes. Survey work has been completed in the following counties: Burt, Cass, Cedar, Dodge, Douglas, Gage, Jefferson, Nemaha, Otoe, Pawnee, Richardson, Saline, Thurston, and Washington.

Blister rust notes from the Southern Appalachian States.--The year 1936 has been one of unseasonable dryness, which has retarded the general spread of the rust in the three Southern States known to be infected, namely, Maryland, Virginia, and West Virginia. Only one new infection center has been reported this summer and that was on a single small pine in the Massanutten division of the George Washington National Forest in Page County, Va. The infection was apparently 10 years old. Blister rust cankers on pine have been found by the hundreds in the Shenandoah National Park, particularly at Skyland and at Elk Wallow, along Skyline Drive. A total of 3,294 pine cankers were removed this summer from 600 pines which have a high ornamental value in the Park. In addition, 98 trees were removed because they were so badly infected that they could not be saved by cutting out the diseased parts. During July and August Ribes-eradication crews in the six Southern Appalachian States destroyed 1,519,901 currant and gooseberry bushes on 435,340 acres.

Aecial stage of blister rust found in September.--G. O. Hill, blister rust control agent in Wisconsin, reports the finding of two blister rust cankers in the "fruiting" or aecial stage on a white pine in September. A few similar cases have been reported in the past as late in the fall as October and November, but they are comparatively rare. Ordinarily the aecial stage on pine is completed during the spring, from March to June. It is not known whether these two cankers fruited in the spring.

Menominee Indians donate huge white pine log to Wisconsin State Fair.--A part of the white pine blister rust control exhibit at the Wisconsin State Fair, held in Milwaukee the latter part of August, included a huge white pine log, measuring 54 inches in diameter and 20 feet long, which was donated by the Menominee Indians as a permanent exhibit at the State Fair Grounds. This log came from a northern white pine tree 281 years old, 140½ feet in height, and over 6 feet in diameter at base of stump. The pine was grown on the Menominee Indian Reservation.

COTTON INSECT INVESTIGATIONS

Abundance and distribution of cotton leaf aphids.--Leaf aphids have been unusually abundant this year on cotton in many parts of North Carolina, South Carolina, Georgia, Mississippi, Louisiana, Texas, and Arizona. An exception to the heavy general infestations was the Delta section of Mississippi, where the infestation was about normal. Three species, the cotton aphid (Aphis gossypii Glov.), the cowpea aphid (A. medicaginis Koch), and the potato aphid (Illinoia solanifolii Ashm.) were present. Although the distribution and abundance of the cowpea aphid on cotton was not determined for all sections, this species was more abundant than the cotton aphid in many fields of South Carolina, especially where the cotton was adjoining, or on land planted to legumes last year. The infestation was general in the eastern and central parts of the State and control measures were necessary in some fields as early as May. Heavy infestations developed on fields that had not been treated with arsenicals for boll weevil control. More inquiries were received from the Gulf coast of Texas concerning aphids than any other insects early in the season. Stands were ruined and plants stunted in many fields. The infestation diminished during the early summer, but with the heavy dusting with arsenicals the infestation increased to the danger point during the latter part of July. In most fields the cotton aphid was the abundant species, but the potato aphid was recorded on cotton from several localities in Texas.

Control of cotton aphids difficult.--K. P. Ewing, Port Lavaca, Tex., reported as follows concerning control tests against aphids on cotton foliage: In southern Texas the cotton aphid becomes a real problem when calcium arsenate is used to any extent. Damaging infestations of this insect almost invariably follow after three or four applications of calcium arsenate have been made to cotton during dry weather. This year, owing to widespread dusting for leaf worms, the cotton aphid became injurious in many fields.

Lead arsenate spray vs. calcium arsenate dust for boll weevil control.--Mr. Ewing also states: "During the past 4 years the cotton leaf worm has required control measures early in the season in the Texas Gulf coast section. Usually from three to six or seven applications of some arsenical are necessary to give seasonal control of this insect. Some farmers in this section use lead arsenate as a spray while others use calcium arsenate as a dust, both of which are satisfactory for leaf worm control. Ordinarily 4 pounds of lead arsenate are mixed with 50 gallons of water and this amount of spray covers from 3 to 4 acres. This makes the cost of the lead arsenate spraying about 15 cents per acre application. From 6 to 7 pounds of calcium arsenate are usually used per acre, making the cost of this control method approximately 45 cents per acre."

Blister mites of the genus Eriophyes.--L. C. Fife, Mayaguez, P. R., reports that blister mites of the genus *Eriophyes* (det. H. E. Ewing) attack two malvaceous plants, *Bastardia viscosa* and *Malachra capitata*, causing blisters similar to those made on cotton by the West Indian blister mite (*Eriophyes gossypii* Banks). Several attempts to get these blister mites to attack cotton have failed, indicating that the species causing blisters on *Bastardia viscosa* and *Malachra capitata* are different from *Eriophyes gossypii* of cotton.

Flea hopper egg parasites widely distributed.--Evidence of the wide distribution of the egg parasites of the cotton flea hopper previously mentioned (See Sept. 1, 1936, News Letter, vol. 3, no. 9) is reported by K. P. Ewing and H. J. Crawford of Port Lavaca. One hundred and twelve samples of croton plants were collected in six States and were sent to Port Lavaca for observation. Each sample consisted of 10 croton plants stripped of leaves, leaving the stems and woody parts in which the flea hopper eggs are laid. Parasites emerged from material from each State, though varying considerably in abundance. The highest average percentage of parasitization was found in South Carolina, with 89.2 percent from 4 samples. From Texas there was an average of 34.4 percent parasitization in 70 samples; from Louisiana, 6.5 percent in 7 samples; from Arkansas, 5 percent from 2 samples; and from Mississippi, 0.1 percent in 10 samples. Emergence was incomplete in the sample from Arizona but a high percentage was indicated. The average for all the samples for which emergence was complete was 23 percent. The 70 samples from Texas were collected in 18 counties in eastern Texas, extending for a distance of about 400 miles north and south.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Gin-trash inspection has gone forward satisfactorily throughout September. All trash produced in the regulated area of Florida has been inspected and large quantities in southeastern Alabama, southern Georgia, and that part of Florida outside the regulated area. The results have been negative all season. A machine has been operated in the Corpus Christi section of Texas, which is north of the lower Rio Grande Valley, where a new infestation was found in August. A very good top crop is being produced in the Corpus Christi section, hence these inspections are of considerable importance. No indications of pink bollworm have been found. In west-central Texas six machines have been operated, results being negative throughout September. The first part of October the inspection of trash in the regulated part of the Western Extension of Texas was begun, also in sections just outside the regulated area. At Midland, within the regulated area, two specimens of the pink bollworm have just been found, and two specimens at Big Spring, just outside the regulated area. These are the first specimens to be found in the Western Extension since the 1934 crop season. A gin-trash crew has worked across northern Louisiana and is now operating in the Delta section of Mississippi. Another crew is operating in Kern and Tulare Counties in California. Both of these latter crews have had negative results. In the Mesilla Valley of New Mexico, within the regulated area, some trash has been inspected with a hand machine from time to time, and three specimens of the pink bollworm have been found. Either gin-trash or boll inspection is carried on each season from the older regulated areas to reestablish the infestation and also obtain some idea as to the degree.

Wild cotton eradication.--The five small W. P. A. crews have continued with the eradication of wild cotton in southern Florida throughout September. These crews seem to be doing excellent work and are engaged principally in the recleaning of areas to prevent seedling plants maturing fruit before work is resumed on a larger scale this fall. During the month they have been recleaning some 2,450 acres in six different counties. From this area 253 mature, 57,351 seedling, and 1,340 sprout plants were removed. A new colony covering about 1 acre, and consisting of 3 mature and 123 seedling plants, was found and destroyed. In addition to the above acreage, over 9,000 acres were gone over without encountering any wild cotton.

Thurberia plant eradication.--The eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona has continued to go forward satisfactorily. Part of the month was devoted to working the foothills, where very few plants were encountered. It was necessary, however, that this area be covered to avoid leaving any plants whatever. This work is being carried on with W. P. A. funds to remove the menace of the Thurberia weevil, which infests these plants, from cultivated cotton. During September 17,200 acres were covered and 81,746 Thurberia plants destroyed.

Road-inspection station.--The first of September a road-inspection station was opened at the junction of the Presidio and Ruidosa roads, about a mile and a half south of Marfa, Tex. For the past several years this station has been operated during the cotton-picking season to prevent unauthorized cotton products being carried from the heavily infested Big Bend section. The station is being operated on a 24-hour basis. On September 14 two lots of seed cotton were intercepted and a dead pink bollworm larva was found in each lot. On October 3, 75 locks of seed cotton were taken from a truck. In this seed cotton six living and nine dead larvae and three living pupae of the pink bollworm were found. This truck had been hauling seed cotton in the Big Bend, and as it was a commercial truck would doubtless have gone to any part of the State where loads could be obtained. The above interception was therefore of considerable importance.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Decomposition of derris when applied to bean foliage.--N. F. Howard, of the Columbus, Ohio, laboratory, reports some rather interesting results from a cooperative experiment with other field laboratories of the Bureau to determine the lasting effects of derris on bean foliage. Bean plantings were made at the following locations throughout the United States: New Haven, Conn., Norfolk, Va., Columbus, Ohio, Baton Rouge, La., Madison, Wis., Manhattan, Kans., Grand Junction, Colo., Twin Falls, Idaho, Ventura, Calif., Corvallis, Oreg., Puyallup, Wash., and Phoenix, Ariz. These plantings were treated with a derris spray and samples of leaves were taken at given intervals and sent to Columbus for analysis. In every case derris was recovered in sufficient quantities at the end of 2 weeks to be detected by the colorimetric and goldfish methods. At Madison, Grand Junction, Twin Falls, Corvallis, and Columbus, derris showed a slower loss of toxicity than at the other laboratories. Light alone does not seem to account for the decomposition rate, neither does high humidity. At Phoenix, where daily temperatures averaged over 100° F., derris was recovered after 10 days. At Ventura, where no rain fell during the test, all of the toxicity had disappeared at the end of 4 weeks. During this test period Ventura had 9 foggy days. This is the only laboratory where fog was reported during the test.

Tomato pinworm favors lower surface of leaf for egg laying.--In laboratory studies conducted by R. E. Campbell, of the Alhambra, Calif., laboratory, on the biology of *Gnorimoschema lycopersicella* Busck, pinworm moths were confined to a single tomato plant with a screen cage. After 3 to 4 days the plant was examined for eggs and the place of occurrence tabulated. Four experiments, using four tomato plants, were conducted. The results indicated that 57.4 percent of the eggs were deposited on the lower surface of the leaf, 40.8 percent on the upper surface, and 1.8 percent on the petioles. No eggs were deposited on other parts of the plant. In an effort to determine the importance of treating the lower rather than the upper surface of tomato leaves infested with the tomato pinworm, 204 leaf folds were collected in an infested tomato field and were examined to determine which surface of the leaves was folded. It was found that 91 percent of the leaves were folded on the upper surface, and only 9 on the under surface.

Biology of tobacco hornworms.--Studies conducted by F. S. Chamberlin and A. H. Madden, of the Quincy, Fla., laboratory, on the biology of Protoparce sexta Johan., developed the following data: Three broods of larvae occur in the Quincy district during the summer. This is the first definite record showing the existence of a third brood of this insect at any point within its known range. Records from 23,222 eggs deposited in cages and 185 eggs deposited in the field show that almost three times as many eggs are laid on the bottom of the leaf as on the top, and that the greatest number of eggs are laid on the top leaves of the plant. The normal number of instars was found to be five, but 21 percent of the first brood had six instars. The average depth of burrowing for pupation of 361 individuals was 4.51 inches. Longevity records obtained from 78 moths in captivity place the maximum length of life of the male at 10 days and the maximum length of life of the female at 16 days.

Adult lima bean pod borers attracted by lights.--Phototropic studies conducted by Rodney Cecil of the Ventura, Calif., laboratory, in cooperation with the University of California, against Etiella zinckinella Treit. in the field, showed that a large numbers of adults were attracted to the different lights. The largest number of adults were attracted to the high intense white light, and to the pale blue light. The red light was only slightly attractive. The sex ratio of adults captured was 60 percent males and 40 percent females, although collections in the fields made with nets show the sexes to be in approximately equal ratio. The females, when dissected, were gravid in 90 percent of the cases. The use of the different lights did not prove of much value as a control, as beans in the vicinity of the lights show a large percentage of the pods wormy, although in this field of 2½ acres the two traps in operation 41 nights have caught 10,405 adult pod borers.

Lime does not reduce infestation of larger bulb fly in narcissus plantings.--Experiments were conducted during 1936 in two plantings of narcissus bulbs, by C. F. Doucette, of the Sumner, Wash., laboratory, to determine the possible effectiveness of lime in reducing infestations of the larger bulb fly (Merodon equestris Fab.). In field No. 1 six blocks of treated bulbs, 50 feet long and 10 rows deep, alternated with six untreated checks 100 feet long and of the same depth. The lime was applied at the rate of 5 pounds to each 50 feet of row. In field no. 2 the application was made on a block in the middle of the planting. Ten rows were treated in each plot for a distance of 50 feet. The plots were arranged in two parallel lines, semicheckerboard style. In field No. 1 samples were taken from each row in both check and treated blocks, and in field no. 2 samples were taken of the five rows in the center of each plot, in order to eliminate marginal influences. Each row sample was examined for infestation on the basis of 100 bulbs. Both plantings had heavy infestations in 1935. There was apparently no significance in the differences of infestation between the treated and untreated lots. Not only did the probable errors exceed the differences, but in the two fields the differences were in opposite direction. The conclusion is apparently justified that the application of lime does not appreciably affect the degree of infestation.

Parasite aids in control of Colorado potato beetle in Ohio.--B. J. Landis, of the Columbus, Ohio, laboratory, reports that approximately 7.5 percent of Colorado potato beetle larvae collected at Columbus and South Point, Ohio, during the period June 8 to July 2 were parasitized by the tachinid *Doryphorophaga doryphorae* Riley.

Hot-water treatment of Delphinium belladonna hybrid plants for control of cyclamen mite.--In an experiment conducted by F. F. Smith, of the Beltsville, Md., laboratory, on the control of *Tarsonemus pallidus* Banks on delphinium plants under conditions simulating the commercial practices of forcing this crop in the greenhouse, plants, infested with mites and grown in the field during 1935, were dug in March 1936 and planted in the greenhouse, where they were grown to flowering stage in May. The plants in three groups, (a) untreated, (b) immersed in water for 20 minutes at 110° F., and (c) immersed for 30 minutes before planting, started into rapid growth in the greenhouse. Leaves in some of the plants immersed for 30 minutes showed injury at the margins as they expanded and these plants were somewhat delayed in their growth, as compared with the untreated plants or those treated 20 minutes. The results of these tests revealed that the plants subjected to the 20-minute immersion attained an average height of the flower spike of 31.2 inches, those subjected to the 30-minute immersion attained a height of 26.4 inches, and the untreated checks a height of 29.1 inches. Measurements also showed that the flower spikes on plants treated for 20 minutes were higher than those treated for 30 minutes or on untreated plants. In the untreated plants the stunting effect of the mites is undoubtedly the cause of the shorter growth.

Wireworm infestation controlled by summer flooding in Washington.--D. W. Jones and K. E. Gibson, of the Walla Walla, Wash., laboratory, report that, as a result of flooding a potato field after harvest for a period of 1 week, 100 percent of the wireworms *Limonius canus* Lec. contained therein were killed. There were, on an average, 19.8 wireworms per square foot in this field before flooding. The fact that soil temperatures in the area flooded during the period involved averaged approximately 73° F. at depths of 6, 12, and 18 inches, respectively, was an important contributing factor in the effectiveness of the treatment.

Imported cabbage worm larvae prove susceptible to very low concentrations of cube.--In laboratory tests directed against quarter-grown larvae of the imported cabbage worm (*Ascia rapae* L.), C. B. Wisecup, of the Sanford, Fla., laboratory, reports that a dust mixture containing 0.055 percent rotenone was very effective in killing the larvae of this species and that this dilution is the most suitable of any of the dilutions tested for use in obtaining comparative results of the reactions of insecticides to *A. rapae* larvae.

INSECTS AFFECTING MAN AND ANIMALS

Natural dissemination of blowfly parasite.--A recent survey by A. W. Lindquist in the vicinity of Uvalde, Tex., shows that the larval blowfly parasite *Alysia ridibunda* Say has spread for a distance of 27 miles from the point of original release in the fall of 1934.

Summer migration of primary screwworm fly from Texas.--Studies by D. C. Parman and W. L. Barrett, Jr., indicate that *Cochliomyia americana* Cushing and Patton migrated from the northern limit of the area in which it overwintered in Texas, in the vicinity of Uvalde, to the southern border of Kansas, a distance of about 525 miles, during the period from March 5, 1936, to August 1, 1936. This rate of travel was west of an approximate north-and-south line from San Antonio through Hillsboro, Dallas, and Fannin County, Tex. East of this line migration northward and eastward was apparently inhibited by heavy rains until July 15, when hot, dry weather favored the northward and eastward dispersion at nearly the same rate as that which occurred west of the line.

Screwworm myiasis in wild animals.--An examination of 298 cottontail rabbits and 205 jack rabbits in the vicinity of Uvalde, Tex., by A. W. Lindquist in May, June, July, and August showed approximately 4 percent of these animals to be infested with larvae of *C. americana*. During this same period 7 infestations in opossums and 4 in deer were also found.

Survey of screwworm incidence in Arizona.--A survey of the screwworm situation made by C. C. Deonier in Yuma, Pinal, Pima, Santa Cruz, Cochise, Gila, Greenlee, Apache, Navajo, and Maricopa Counties, Ariz., indicates that in some areas there are considerable numbers of screwworms each year, whereas other areas have infestations only periodically during certain seasons. The areas generally infested are in the brushy sections along the escarpments to the mountains, but the open country is subject to infestations during the rainy season. The high mountain areas above 6,000 feet are rarely, if ever, infested.

Repellents for screwworm flies.--E. R. McGovran, of the Valdosta, Ga., laboratory, reports that preliminary field tests with a mixture of pine-tar oil 85 percent, acetone 10 percent, and derris resinate 5 percent, and a powder containing tannic acid 40 percent, phenothiozine 50 percent, and m-cresol 10 percent indicate that both these mixtures exhibit a greater repellency to screwworm flies than does pine-tar oil alone.

Soil treatment for destruction of primary screwworm pupae.--Investigations by E. F. Knipling and A. L. Brody on methods for destroying pupae of *C. americana* in the soil have shown the relative value of the following materials:

Treatment	Relative value	Flies emerged
		Number
Sodium cyanide (2 oz. in 1 gal. water)	1	0
Sodium cyanide (2 oz. in 2 gal. water)	2	0
Sodium cyanide (1 oz. in 2 gal. water)	3	0
Carbon disulphide (1 qt.)	4	0
Carbon disulphide emulsion (Equal parts with neutral sulphonated castor oil) (1 qt. in 2 gal. water)	5	0
Carbon disulphide emulsion (1 pint in 2 gal. water)	6	0
Fire (approximately 1/20 cord of wood used)	7	0
Kreso dip (1/2 pt. in 2 gal. water)	8	3
Kerosene (1 gal.)	9	8
Paradichlorobenzene (4 oz.)	10	20
Five-percent phenol solution (water), (1 gal.)	11	25
Waste crank-case oil (1 gal.)	12	43
Kerosene oil emulsion (20-percent strength), (2 gal.)	13	75
Lime sulphur (1/2 lb. in 2 gal. water)	14	84
Control 1, 2, 3	15	62, 68, 95

Larvae were confined in areas of 1 square yard on Bermuda grass sod. Treatments were made on the fifth day after the larvae were placed on the soil.

Viability and longevity of mosquito eggs.--H. H. Stage and C. M. Gjullin, working at Portland, Oreg., report the following observations: "Soil and debris containing eggs of *Aedes vexans* Meig. and *A. aldrichi* Dyar and Knab were placed on the ground of a screened outdoor cage in May 1935. During the first week of June and the first week of September of each year, 12 samples of this material are flooded to determine how long the eggs may remain viable. To date the following hatches have been recorded: June 1, 1935, *A. vexans*, 2,357, *A. aldrichi*, 2,097; Sept. 1, 1935, *A. vexans*, 1,723, *A. aldrichi*, 368; June 1, 1936, *A. vexans*, 2,663, *A. aldrichi*, 131; Sept. 1, 1936, *A. vexans*, 358, *A. aldrichi*, 51."

Effect of continuous inundation on winter-dormant mosquito eggs.--Messrs. Stage and Gjullin state that eggs of *A. vexans* and *A. aldrichi* have been found to be dormant during the winter months and do not hatch unless warmed and dried for several days before flooding. Samples of soil and debris containing eggs of these species were placed in containers and kept flooded under outdoor conditions from January and March until May. During this period, 2.2 percent of the *A. vexans* and 5.7 percent of the *A. aldrichi* eggs hatched. Rising temperatures in April ended the winter dormant period and areas flooded by the rising rivers produced large hatches in the field by May 1. The samples mentioned above were then dried and reflooded in May, whereupon a normal hatch was noted. Evidently the eggs were not injured by this 3-month period of inundation. These observations were confirmed in one instance in nature. To learn of the effects of a longer period of inundation, a portion of the samples were kept continuously flooded from March until August 10. No hatching occurred during this interval. The samples were dried and reflooded at this time and a 15-percent hatch of *A. vexans* and a 35-percent hatch of *A. aldrichi* were obtained. Six months inundation had apparently destroyed 85 percent of the *A. vexans* and 65 percent of the *A. aldrichi* eggs.

Temperature required to prevent infestations of fabrics by webbing clothes moth and black carpet beetle.--Preliminary studies by Wallace Colman, of the Beltsville, Md., laboratory, on the effect of temperature on the development of *Tineola bisselliella* Hum. and *Attagenus piceus* Oliv. show that 100-percent mortality of first-instar larvae of *T. bisselliella* exposed at 15° C. and 42 percent relative humidity occurs. This indicates that an infestation could not become established at this temperature and humidity. The most important point with respect to *A. piceus* is that this species does not oviposit at 15° and 42 percent relative humidity. This indicates that this species could not become established at this temperature and humidity. Thus, so far as these two species are concerned, the results indicate that material kept at 15° and 42 percent relative humidity would remain free of infestation. The data indicate that the threshold of development for these two species lies between 15° and 20° C. at 42 percent relative humidity, when the life cycle is initiated by the introduction of adults taken from cultures kept at summer room temperatures.

Dallas laboratory moved to new quarters.--The laboratory formerly located at 4529 Reiger Ave., Dallas, Tex., has been moved to a new location on the west bank of the Trinity River, overlooking the business section of the city. The laboratory on Reiger Avenue was opened in 1905 and was for many years headquarters for the old Division of Southern Field-crop Insect Investigations. Since about 1915, however, the work has been devoted almost entirely to the studies of insects affecting the health of man and animals. With the growth of the city and the complete surrounding of the laboratory by residences, many of the investigations of the division have been restricted. The abandonment of the laboratory at Reiger Avenue marks the passing of perhaps the oldest laboratory in the Bureau in point of continuous occupancy of the same quarters. The address of the new location is Corner East Eighth St. Road and Corinth St., Oak Cliff, Dallas, Tex.

Degree of parasitization of the American dog tick by Hunterellus hookeri How.--C. N. Smith and Helen Louise Trembley, studying the habits of the tick parasite *H. hookeri*, observed that a higher degree of parasitization was obtained when ticks were exposed on the host, after having been attached for 2 days or longer. Parasites which had been emerged for 2 days and those emerged only 2½ hours seemed equally effective. In two cases, one on the host and one with ticks that had dropped, one female parasitized eight ticks. Eighteen males and 76 females emerged from five nymphs of *Dermacentor variabilis*, an average of 19 parasites per nymph.

Poisoned baits tested for control of fire ants.--B. V. Travis reports the following results in tests to determine the value of poisoned baits for the destruction of fire ants: "Of the baits tested, canned corned beef, evaporated milk, cheese, cow's milk, peanut butter, egg yolk, and cow's butter were the most attractive to the fire ants. Although sweet foods were somewhat attractive to ants, in general milk and milk products were the most attractive in these tests. The ants were considerably attracted to greasy foods. Since canned milk and canned corned beef were found highly attractive to fire ants, a mixture of these two substances with sodium arsenite was tested. When sodium arsenite was present in very small quantities (0.025 percent), fire ants consumed the food readily, but when the bait was changed to 0.25 percent sodium arsenite the ants ate sparingly and in a few minutes covered the bait with dirt. Very few dead ants were observed around the colonies thus treated and no reduction in numbers could be noted."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Twenty-four living larvae of the West Indian fruit fly (*Anastrepha acidusa* Walk.) were collected on June 5 in mangoes in the field at Bayamon, P. R. A living larva of the Mexican fruit fly (*Anastrepha ludens* Loew) was intercepted at Laredo, Tex., on July 3 in a guava in baggage from Mexico, and a living larva of the same fruit fly was taken at Brownsville, Tex., on July 18 in an avocado in baggage from Mexico. Living specimens of the aphid *Myzus ornatus* Laing arrived at New York on May 11 on *Ricinus* leaves in ship's quarters from England. The name *Myzus veronicae* Del G. has been used in the past for this species. A living larva of the West Indian sweetpotato weevil (*Euscepes batatae* Waterh.) was taken at Boston on July 6 in a sweetpotato in stores from St. Vincent, Lesser Antilles. Adults of the bruchid *Bruchus emarginatus* Allard were intercepted at Washington, D. C., on June 23 in seed of pea (*Pisum sativum*) in the mail from Peshawar, India. A living adult of the elaterid *Conoderus bifoveatus* Palis. arrived at New Orleans on May 5 on a pineapple in cargo from Cuba. Seven living adults of *Pachymerus olearius* Bridwell were taken at New York on July 15 in seed of *Attalea excelsa* in cargo from Brazil. Two hitherto known hosts of this bruchid are *Acrocomia sclerocarpa* and *Orbignya speciosa*. Living larvae of the turnip gall weevil (*Centorhynchus pleurostigma* Marsh.) and the chrysomelid *Psylliodes chrysocephala* L. were intercepted at Philadelphia on July 1 in white turnips in stores from Scotland. Living specimens of *Haplothrips setiger* Pr. arrived at Baltimore on March 19 in packing about cedar and violet plants in the mail from Germany. A living adult of the weevil *Orchidophilus peregrinator* Buch. was taken at San Francisco on May 7 in an orchid, *Vanda luzonica*, in baggage from the Philippines. A living adult of the banana root borer (*Cosmopolites sordidus* Germ.) was intercepted at Laredo, Tex., on July 23 with banana debris in cargo from Mexico. A living adult of the lyctid *Minthea rugicollis* Walker was taken at Brownsville, Tex., on May 27 on a pineapple in baggage from Mexico. W. S. Fisher reports as follows: "This is an oriental species. Its natural habitat is probably the Philippines, Siam, China, Ceylon, and the Malay region. It has been introduced into Europe, West Indies, and Hawaii. Hopkins and Kraus record it from Missouri and it has been intercepted in wooden cases from India, both at New York and at Philadelphia."

Finding fruit fly in pockets.--That pockets, whether they are in the coat of a lady or the suit of a man, may be the hiding place of fruit fly was illustrated recently when the Puerto Rican ship *Borinquen* unloaded its quota of passengers in New York on September 14. As it came from fruit fly sections of the West Indies, its passengers received more than casual inspection. It was at the gate that the Plant Quarantine Inspector suggested that a lady, leaving with her baggage, show what she had in her coat pocket. She did. It was a contraband mango in which was found a fruit fly, later determined as *Anastrepha* sp. A male passenger, perhaps not to be outdone by the female of the species, held his hand in his pocket as though nonchalantly fingering a handkerchief. His pose failed when the inspector suggested that he remove his hand and, seeing that the bulge still remained in the pocket, had him take out a package that contained nisperos, in which no signs of infestation were noted. Such frequently occurring incidents show the possibilities and ease with which fruit fly may be carried into this country.

Pink bollworm found in seeds related to cotton.--Routine inspection of cargo at the Appraiser's Store, port of New York, revealed a 26½-pound shipment of *Abelmoschus* (*Hibiscus*) *manihot* seed from Brazil. Among other things, a living larva and a dead pupa of the pink bollworm were taken out of this shipment of seeds. The larva was found in the characteristic "webbing" together of several seeds. No indication of the larva being completely embedded in the seed was noted, as the seeds are too small for a larva to feed in a single one. The dead pupa was found in the "webbing." Evidently, the pink bollworm had been feeding in the seed pods of the hibiscus plant and when the seeds were harvested the bollworms accompanied them to their destination. The finding of pink bollworm in this host would indicate that this insect may be introduced into this country by shipments of seeds of plants related to cotton. The shipment was fumigated.

Mislabeled "clothing".--A recent mail interception made at Boston, Mass., arrived at the Washington, D. C., Inspection House declared as "overalls and shirt", with no mention whatever that the package contained plant material. Upon examination of the contents of the parcel at the Inspection House, no wearing apparel was found; instead, an assortment of 49 miscellaenous plants and bulbs, including caladium, impatiens, begonia, aralia, fern, and asparagus. This collection of plant material invoiced as overalls and shirt was forwarded by a man who was vacationing, apparently, in Bermuda, to himself at New Bedford, Mass. This case appears to be a rather clumsy method of importing plants in violation of plant-quarantine laws, especially when foreign packages are so carefully examined and appraised by customs officials.

Pathological interceptions of interest.--*Anguillulina dipsaci* (Kuhn) Gerv. and v. Ben. was intercepted from Portugal for the first time on September 18 at Houston in potato. Interceptions of this nema are being made in bulbs from Europe. *Bremia lactucae* E. Regel was intercepted on globe artichoke for the first time on September 15 at New York in stores from France. *Cephalosporium* sp., unlike any species with which the specialists were familiar, was intercepted on apples from Australia on August 18 at New York. *Heterodera marioni* (Cornu) Goodey was intercepted in parsnips from Trinidad on September 17 at New York. The first interception of *Leptosphaeria tritici* (S. Gorovaglio) Pass. was made at Baltimore on September 4 on wheat straw around bottles. *Mycosphaerella brassicicola* (Fr.) Lindau was intercepted from Italy at New York on August 6 on cabbage and on broccoli greens. *Uromyces betae* (Pers.) Lev. was intercepted at New York on September 8 on beet leaves from Chile. Arthur's Manual does not include South America in recording the distribution of this rust.

DOMESTIC PLANT QUARANTINES

Japanese beetle intercepted in shipment of cut flowers.--A Japanese beetle was recently found by the Philadelphia inspectors in shipment of cut flowers. Although the beetle was quite cold and apparently dead, it soon became active after removal from the iced container. Inspectors at New York recently found a bag of live insects in the mail shipped in apparent violation of the Insect Pest Act. The shipment was reported to the proper authorities.

Port inspectors report violations of domestic quarantines.--Cooperative arrangements have recently been made with the Division of Foreign Plant Quarantines whereby plant material, originating in the United States and carried by travelers into Canada and back into this country through Detroit in violation of Federal domestic quarantines, will be brought to the attention of a transit inspector. The arrangement is the result of an interception reported by a port inspector at Detroit. This uncertified shipment contained white pines, spruce, and other plants with soil and was being carried in an auto from the Adirondacks to Illinois, via Canada and Detroit.

Transit-inspection activities at Chicago.--The volume of inspection work carried on at Chicago is shown in a recent report from J. M. Corliss, inspector in charge, in which it is stated that 230 trains arrive daily carrying an average of 22,470 sacks of parcel post, all of which are reworked in the new post office building. The 2,000 segregation clerks, sorting packages for transfer to various States, have become very skillful in detecting plant shipments which are then held out for transit inspectors to examine. Approximately 400 express cars, Mr. Corliss states, pass through Chicago daily for Chicago delivery or for sorting at the nine different terminals in the city where transit inspectors examine the shipments for compliance with the restrictions of Federal domestic plant quarantines. Nineteen railways carrying freight shipments have cooperated in transit inspection by providing information daily by means of waybills and telephone calls as to shipments of nursery stock, Christmas trees, stone, sand, and other materials passing through the local freight transfer points. Large quantities of produce from the areas infested with the Japanese beetle were made available for inspection in this manner during the summer, and it was necessary to hold freight shipments of more than 3,000 baskets of green beans, as well as other produce, until it was determined whether they were eligible for certification at origin. The examination of railway cars for cleanliness requirements under quarantine regulations has included the inspection of vegetable bunkers and refrigerator cars, which might contain decayed produce.

Phony peach tree removal intensified in Georgia.--"The phonies are certainly coming out", according to the project leader, who reports that all relief labor available for the eradication of diseased peach trees in Georgia has been concentrated in crews following Federal and State inspectors, removing such trees as rapidly as they are located. Over 60,000 "phony" trees were removed from this important peach-producing State in the period from July 1 to September 19, as compared with about 40,000 in the entire fiscal year 1936. There has been a decrease in the number of laborers available for the work, owing to the absorption of many men on relief rolls by local activities. Eradication work is also under way in Alabama, Arkansas, Illinois, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Texas.

Citrus canker inspection.--Although several properties in the Galveston area of Texas showed some recurrent infections of canker on seedlings, on being reinspected in August and September, no canker was found in Jefferson County when reinspection was made in August in the vicinity of the six properties near Hamshire, which last winter were found to be badly infected with canker. All citrus trees were destroyed in the course of inspection. Twenty-one counties in Texas have been inspected since the first of July by the corps of Federal and State inspectors and no canker has been found outside the counties of Galveston, Brazoria, and Harris. Inspection has recently been started in Alabama and Mississippi. In Louisiana the reinspection of eight parishes since July 1 resulted in finding no infections, with the exception of the case of canker found on an island in Terrebonne Parish in July.

Pink bollworm quarantine modified.--The domestic Federal quarantine relating to the pink bollworm of cotton was modified, effective October 14, by releasing from restriction all parts of the State of Florida which were formerly under regulation. No pink bollworm infestation has been found in regulated areas in Florida during the intensive inspections of the 1935 and 1936 field seasons.

INSECTICIDE INVESTIGATIONS

Patent granted on new organic insecticide.--Under date of August 4, 1936, the Patent Office granted to L. E. Smith U. S. Patent No. 2049725, covering a class of organic materials known as diaryl thioxins, with particular reference to the compound phenothioxin $S\ (C_6H_4)_2O$, which is lethal to mosquito larvae at a concentration of two parts per million parts of water and which, when used with bentonite and a wetting agent, was more effective than lead arsenate against codling moth larvae in some laboratory tests.

New thermoregulator developed.--L. D. Goodhue, Beltsville, Md., has described in Industrial and Engineering Chemistry (vol. 8, no. 5, p. 387, Sept. 15, 1936) an improved device for controlling the temperature of rooms and cabinets. It comprises a glass apparatus containing mercury and a volatile liquid such as pentane, so arranged as to act as a differential manometer in response to changes in the vapor pressure of the organic liquid. Its advantage lies in the fact that it is very sensitive, and will handle rather large currents directly without a relay. One model has been used at the Beltsville laboratory directly in series with a heater drawing 12 amperes at 110 volts, and has satisfactorily controlled that load for months at a time. A patent has been applied for.

New process for preparing pyrethrins patented.--The investigations of pyrethrum being conducted by F. B. LaForge and H. L. Haller, Washington, D. C., led these investigators to the discovery of a method of preparing concentrates which contain appreciably more of the active principles than heretofore available, and this process has now been granted U. S. Patent 2050974, issued August 11, 1936. The process consists essentially in dissolving commercially available oleoresin (the material extracted by petroleum ether from the flowers) in glacial acetic acid and then diluting somewhat with water, whereby much of the inactive material is precipitated as a mass of wax or fat, which is solidified by cooling and removed by filtration. Further dilution of the filtrate precipitates an oil, the ether-soluble part of which can be decolorized and recovered in the form of a light yellow oil containing from 60 to 65 percent total pyrethrins, as compared with about 30 percent in the original oleoresin.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Unusual habit of a cerambycid.--Among a collection of larvae taken from roots of Astragalus near Raton, N. Mex., and submitted by H. G. Byers, of the Bureau of Chemistry and Soils, were numerous specimens of a cerambycid. The plants were growing in soil rich in selenium, which, as Dr. Byers points out, is known to be poisonous to many plants and animals, including certain insects. The larvae were examined by A. G. Boving, who reports that they belong to the subfamily Lepturinae and probably to the genus Lepturus. The larvae of this subfamily, however, are found chiefly in decaying logs or dead heartwood of deciduous trees or under the bark of conifers. Larvae of the genus Desmocerus are known to occur in living roots of Sambucus; but there appears to be no previous record of a lepturine infesting the roots of Astragalus or other herbaceous plants. Instances of this kind indicate the desirability of definitely associating, by rearing wherever possible, the immature forms with adults.

A new record for an uncommon grasshopper.--The discovery of a nearly perfect female of the short-winged grasshopper (Paratylotropidia beutenmuelleri Morse) in the food contents of a turkey, taken near Staunton, Va., by the Biological Survey, suggests again the value of birds as collectors of insects. Described in 1907, this species was known only from three females until 1926. Since then several records have been added from South Carolina.

The only previous Virginia record, however, is that of a male taken near Panorama. With the female recorded here were well preserved specimens of four other species of leaping Orthoptera.

Rediscovery of Saccharosydne saccharivora (Westwood) in United States.--Specimens of a delphacid, collected on sugarcane at Fellsmere, Fla., on September 26, by J. W. Ingram and E. K. Bynum, of the Division of Cereal and Forage Insect Investigations, have been identified by P. W. Oman as Saccharosydne saccharivora (Westwood). This appears to be the second record of S. saccharivora, a common West Indian species, occurring in the United States, it having been previously recorded by Van Duzee in 1909 from a single specimen collected at Tampa, Fla. Mr. Ingram stated that the species was causing rather severe injury to sugarcane at Fellsmere, and that nymphs were also found in small numbers on Digitaria sanguinalis, Paspalum urvillei, and Dactyloctenium aegyptium. References concerning saccharivora in the West Indies indicate that, although the species is common, it is usually not a severe pest of cane. Some of the nymphs included in this sending were parasitized by larvae of a dryinid, according to R. A. Cushman.

Records of new species of aphids belonging to the genus Amphorophora.--In a series of aphids submitted by W. W. Baker, of the Division of Truck Crop and Garden Insect Investigations, and collected on Rubus in the State of Washington, were four species of Amphorophora, three of which appear to be new species, according to P. W. Mason. The fourth species is Amphorophora maxima Mason, which has remained unknown since it was described in 1925 from California. In Mr. Mason's revisionary paper on this genus of aphids there are included eight species from Rubus, four of which were described in that paper as new. These latest acquisitions increase the number of known species on Rubus to 11. In this same lot from Mr. Baker there was also a new species of Amphorophora from Vaccinium. The only other species of this genus known from this host is Amphorophora vaccinii Mason.

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR OCTOBER 1936

Vol. III, No. 12 (Not for publication) December 1, 1936

FRUIT INSECT INVESTIGATIONS

Peach borer does not have 2-year cycle in Georgia.--O. I. Snapp and J. R. Thomson, Fort Valley, Ga., report results of 3 years' observations to determine whether some individuals of Conopia exitiosa Say require 2 years to complete their life cycle. All of the insects under observation completed their life cycle in not more than 1 year, and thus far no evidence has been obtained to indicate that under Georgia conditions some individuals of this species may require 2 years.

Infestation in stored raisins.--Samples from a lot of about 20 tons of screened raisins, the season's production from one ranch, taken on the ranch by Perez Simmons and H. C. Donohoe, of the Fresno, Calif., laboratory, in October 1935, indicated a population of 500 larvae of the raisin moth (Ephestia figulilella Greg.) per ton. The original infestation, before the raisins were passed through a portable electric shaker-screen, developed at the Fresno laboratory, had been about 16,000 raisin-moth larvae and pupae per ton. After storage for 10 months in a typical commercial storage yard, the infestation per ton was found to be about as shown in the following table:

Species	Individuals present after--	
	Screening (Oct. 1935)	Storage 10 months
	Number	Number
Ephestia figulilella Greg. (larvae, pupae)	500	300
Plodia interpunctella Hbn. (larvae, pupae, adults)	0	800
Oryzaephilus surinamensis L. (larvae, pupae, adults)	0	15,000
Tribolium, 2 species (adults)	0	100
Cryptolestes sp. (adults)	0	300
Cephalonomia tarsalis Ashm. (adults)	0	1,000

Experiments to determine population of adult codling moths in apple trees.--E. R. Van Leeuwen, of the Yakima, Wash., laboratory has carried on experiments to determine the population of adults of the codling moth in apple trees, as an aid to the evaluation of field experiments with baits. During the period August 11 to August 25, 11 medium-sized sprayed apple trees were covered with a tent and fumigated with a nicotine dust. In these 11 trees an average of a little more than 6 moths per tree were killed, and it is believed that this figure represents the total number of moths in the trees before the tent was placed in position. During the same period of time 1 pine-tar-oil-molasses bait located 15 rows from the fumigated trees captured an average of 90 moths per night, indicating that the bait was capturing moths from a number of trees in the vicinity. In order to obtain data on the number of moths attracted to a baited tree but not caught in the trap, a sprayed tree containing one molasses bait was fumigated each morning during the period August 5 to August 16. During this period an average of 5 moths was brought down by the fumigant each morning as compared with 62 moths caught in the bait during each evening, indicating further that moths were finding their way to the baits from a number of trees in the vicinity of the trap. An unsprayed tree in an abandoned orchard was also fumigated in the same manner and 122 moths were captured in one fumigation.

Development of immature stages of Japanese beetle in the fall.--In the News Letters for July and August 1936, T. N. Dobbins, Moorestown, N. J., presented summaries of the relative proportions of the various stages of the Japanese beetle represented in the soil population for those months, in comparison with the same periods in 1935. These summaries showed a decided retardation in development during the current season, particularly in the early instars. Surveys made in October showed that the unusual proportion of first instars recorded for July, August, and September persisted during the first 10 days of October. Normally during October in the latitude of Moorestown, less than 1 percent of the soil population occurs as first-larval instars. The marked retardation of larval development, however, did not continue through October, but has apparently been compensated by a much more rapid development, as by the end of October a greater proportion of third instars were entering hibernation even than during the corresponding period in 1935. This somewhat accelerated development seems to be correlated with higher soil temperatures, which were prevalent during the latter part of September and first part of October this year, resulting in a "catching up" of larval development as the hibernation period approached.

Importation of Japanese beetle parasite.--M. H. Brunson, Moorestown, reports on his examination of a shipment of Tiphia popilliavora Roh. (Yokohama strain), received at Moorestown on October 20, 1936, from R. W. Burrell of the Bureau's laboratory at Yokohama, Japan. The shipment consisted of 1,067 field-collected females. When the shipment was received at Moorestown and examined, it was found that 726, or 68 percent, of the parasites were alive, 252, or 23.6 percent were dead, and 89, or 8.3 percent, were unaccounted for. The general condition of the shipment was excellent; therefore it is believed that the mortality can be considered normal for females collected at this season of the year.

The oriental beetle at Springfield, Mass.--I. M. Hawley, of the Springfield, Mass., sublaboratory, reports on the finding of a heavy infestation of larvae of Anomala orientalis Waterh. on the grounds of one of the large insurance companies in Springfield. This is the first instance brought to our attention of heavy infestation by this species in Springfield.

MEXICAN FRUIT FLY CONTROL

Citrus shipping starts in lower Rio Grande.--October 1 marked the opening date for shipment of the 1936-37 citrus crop from the Rio Grande Valley. All indications point to the shipment of the largest crop so far produced in this area. The expected movement is estimated to reach a total of 20,000 cars, if weather and market conditions continue favorable. Excellent progress has been made in obtaining compliance of growers and packers with quarantine regulations. Every available means has been used to acquaint the citrus industry with the necessity of grove and packing-house sanitation and, as a result of these efforts, the industry as a whole is enthusiastic in its support of the program. The shipment of fruit compares favorably with last year's record. Permits were issued during October for the movement of 870 cars by rail and 2,193 loads by truck.

Only one Mexican fruit fly trapped.--Only one Anastrepha ludens Loew was trapped during the month. Through the same period last year 23 adults had been taken from 22 premises. During the same period for the two previous years, however, none had been trapped. It can be seen that the population varies from month to month yearly.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Hessian fly survival favored by local environment.--E. T. Jones, of the Manhattan, Kans., laboratory, reports that a search for wheat stubble infested with hessian fly was made throughout central and southeastern Kansas during June, July, and August. A few very light infestations were found in sheltered spots. The only appreciable infestation discovered was located in stubble at the bottom of a swale in a field on the south side of the Smoky Hill River. It is probable that this swale, which was the result of a highway excavation and was approximately 600 by 30 by 8 feet in size, held sufficient moist air from the river to permit the flies to oviposit and the larvae to migrate during May, when drought conditions elsewhere prohibited reproduction. Representative samples of stubble taken from the bottom and from the upper edge of this swale differed materially in infestation. Each sample consisted of 100 plants, an average of 400 culms. Seventy percent of the plants and 32 percent of the culms taken from the bottom were infested with an intensity of 1.9 puparia per infested culm. Stubble taken from along the upper edge, about 6 feet higher and 20 feet distant, carried a plant infestation of 35 percent, and a tiller infestation of only 13 percent, with an average intensity of 1.4 puparia per tiller. As determined by observation and rough count, the field, exclusive of the swale, had a plant infestation of less than 5 percent. It was burned off before actual infestation could be determined.

Food supply as an inhibiting factor in the fecundity of devastating grasshoppers in dry-land area.--C. C. Wilson, of the Sacramento, Calif., laboratory, reports a study of the maturation and deposition of eggs has been made of *Melanoplus devastator* Scudd. in the recent outbreak of 1936 in the foothill-grassland habitat in California. Repeated dissections of females, beginning in July and extending to the latter part of October, indicated no development of the ovaries. An egg-pod survey indicated but few adults had deposited eggs, yet the population was estimated at from 5 to 15 per square yard on one area of 1,000 acres. The depleted food supply, which consists largely of wild grasses and tarweed in their natural habitat, seems to be the inhibiting factor in preventing ovarian development of the species. The grasshoppers, although normal in size, were sluggish and easily captured. On further examination, no parasitization was noted and the fat bodies, which were numerous in July, had practically ceased to exist in October. Experiments conducted in Siberia (Rubtzov Bull. Ent. Res. pp. 339-348, Sept. 1934) indicated that the fertility may be reduced 30 to 40 percent by insufficient food. Although the period of observation for the dry-land areas in California is short, it does indicate that scarcity of food is a factor in reproduction and may throw some light on the reason for the reduction of grasshoppers to nonoutbreak proportions.

Resistance of sweet corn to European corn borer.--Morris Schlosberg and Ralph Mathes, Toledo, Ohio, report as follows on results of observations on sweet corn resistance to attack by the European corn borer: Observational tests were conducted near Toledo, Ohio, this year to determine from among available material those inbred strains of sweet corn that may possess resistance to infestation by the European corn borer. Further studies will follow with such strains to determine the characters associated with resistance for use by breeders in developing resistant commercial hybrids. Materials for observation were provided by the following State agricultural experiment stations: Connecticut, Illinois, Iowa, Maryland, Michigan, Minnesota, Ohio, and Indiana (cooperating with the Federal Bureau of Plant Industry). Data were obtained from 111 inbred and 53 hybrid sweet corn strains, tested in quadruplicated plots in randomized blocks. The data include the following: (1) The number of borers per plant per strain resulting from hand infestation with two egg masses per plant; (2) the number of borers per plant resulting from natural infestation; (3) the midtasseling dates of the strains; (4) the midsilking dates of the strains; (5) the mean heights of the strains in inches on July 10, at the time hand infestations were made, and coincident with the peak of natural oviposition; (6) the number of tillers per plant per strain. The borer populations resulting from uniform hand infestation of the plants are the basis for comparing the strains. The data relating to natural infestation and to developmental differences among the strains are essential to account for possible associated influence of these on the borer populations resulting from the hand infestations, as it is impossible to eliminate such differences from the tests where so many strains are involved. Such associated effects may not be attributed to the presence of susceptible or resistant traits. For purpose of analysis, the data were grouped by strain types. By analysis of variance and calculation of the least significant difference between any strain result and the average of all strains of a type, the strains were grouped into significantly low, average, and high population classes. A summary of the number of strains in each class of each type is given below. The range in numbers of borers per plant is also shown.

Type	Total strains	Strains significantly— Below average	Average	Above average	Borers per plant, per strain Lowest	Average	Highest
	Number	Number	Number	Number	Number	Number	Number
Inbred strains							
Bantam------------	39	12	17	10	2.92	8.23	14.25
Country Gentleman-	28	8	11	9	1.60	5.46	8.70
Evergreen----------	44	13	21	10	1.58	5.37	11.00
Hybrid strains							
Bantam------------	22	8	7	7	2.92	7.33	12.42
Country Gentleman-	16	4	10	2	3.42	4.67	7.15
Evergreen---------	15	3	9	3	2.95	4.64	8.00

With reference to the tabulation above, it is not to be inferred that all strains in the significantly low group are borer resistant, nor that all strains in the significantly high group are borer susceptible, as in either case the result may be due to concomitant seasonal influences rather than to inherently resistant or susceptible traits. The low group, however, may be considered the potential source of characters associated with resistance.

Colonization of European corn borer parasites.--W. A. Baker, of the Toledo, Ohio, laboratory, summarizes releases of imported and exotic parasites of the European corn borer for the 1936 season, the releases extending from early in June through the first week in August. The objectives of the current season's program were the distribution of the ichneumonid Inareolata punctoria Roman over as much of the area infested by the corn borer as possible and the testing in the more southern range of the borer of two species of parasites, Cremastus flavoorbitalis (Cameron) and Microgaster tibialis Nees, which had not become permanently established following releases in colder areas. In addition, adults of the braconid Chelonus annulipes Wesm. were made available for release through the cooperation of the Entomological Branch of the Canadian Department of Agriculture and Lydella stabulans var. grisescens R. D. was obtained incident to collections made to procure other species. Thirty-five colonies were released in 10 States, comprising a total of 34,488 adults of five species as tabulated below.

State	Species released					
	I. punctoria	M. tibialis	C. flavoorbitalis	L. stabulans	C. annulipes	Total
	Number	Number	Number	Number	Number	Number
Massachusetts	1,679	--	--	--	--	1,679
Connecticut	--	1,994	--	--	--	1,994
New Jersey	585	1,809	599	810	--	3,803
Maryland	--	--	--	5,365	--	5,365
Virginia	1,188	3,199	2,371	--	2,105	8,863
New York	1,779	--	--	--	--	1,779
Pennsylvania	--	--	--	1,965	--	1,965
Ohio	6,835	--	--	--	--	6,835
Michigan	1,606	--	--	--	--	1,606
Indiana	599	--	--	--	--	599
Total	14,271	7,002	2,970	8,140	2,105	34,488

Parasitization of European corn borer in Massachusetts.--C. A. Clark and E. D. Burgess, Moorestown, N. J., report that during an examination of cornfields in the vicinity of Malden, Mass., in order to determine their suitability as a source of supply for adults of I. punctoria for 1937 releases in noncolonized sections of the corn borer infested area, an average total parasitization of 24 percent prevailed in the 15 fields observed--22 percent by I. punctoria and 2 percent by L. stabulans var. grisescens.

Certain varieties of wheat show resistance to hessian fly in Indiana.--C. M. Packard, Lafayette, Ind., reports that out of about 2,400 wheat varieties, selections, and hybrids examined for spring infestation, Variety F. P. I. 94587, Marquillo, Marvel, and 5 selections and 11 hybrids of Illinois No. 1 show high resistance. With some of these as parents the breeding of fly-resistant wheats suitable to the soft-winter-wheat region is in progress in cooperation with the plant breeders at Purdue. Illinois No. 1 selections and F. P. I. 94587 have also shown resistance in other States than Indiana.

Chinch bug repellents and attrahents.--Mr. Packard reports that a total of 211 essential oils and other odorous chemicals were tested during the summer for their attractiveness to chinch bugs by himself, Curtis Benton, E. V. Walter, and W. B. Noble. None of the chemicals showed particular attractiveness to chinch bugs, but certain ones would appear to be definitely attractive to Diabrotica 12-punctata Fab., flea beetles, Orius insidiosus, or pomace flies. Materials showing attractiveness in these preliminary trials are indicated below:

D. 12-punctata:

Anise oil
Anisitic aldehyde, synthetic
Anisaldehyde
Anisique alcohol
Benzyl acetate
Benzylic alcohol
Benzyl butyrate
Cannamic alcohol
Cinnamaldehyde
Cymene-p
Styrax oil

Flea beetles:
- Thyme, red oil of
- Thyme, white oil of
- Thymene

Orius insidiosus:
- Spike, oil of

Pomace flies:
- Anisic aldehyde, synthetic
- Anethol
- Asafoetida oil
- Iso valeric acid

In tests made to determine the repellency of this list of chemicals to chinch bugs, the preliminary test showed definitely that most of the chemicals were only slightly or not at all repellent. A total of 34, however, appeared to be strongly repellent. One or two apparently turned back the bugs one-half an inch or more before they reached the chemicals. Although more conclusive tests are necessary the following might be mentioned as showing more promise of repellents: Ajowan, oil of citronella, pine-needle oil, pine-tar oil, and savory oil. Late in September the 34 chemicals showing most promise as repellents in the July tests and the 9 additional materials, including ammonia, were tried on corn in which the bugs, mostly adults, were numerous and congregated mainly under the leaf sheaths. A single infested stalk was treated with each chemical by inserting a small impregnated pad of cotton under each leaf sheath. Nine check stalks were similarly treated with cotton pads bearing no chemical. Subsequent examinations showed the bugs to be still numerous under the sheaths of the checks and many of the chemically treated plants. Eleven of the 43 chemicals, however, appeared to be not only highly repellent but also lasting, notwithstanding the 3.15 inches of rain that fell between the first and last observations, as shown in the following table, accurate counts being impossible without removing leaf sheaths and thus spoiling the experiment.

Chemical applied Sept. 23	Bugs present after-- 24 hours	8 days	Odor after 8 days
Carvone	None	Very few	Moderate
Celery seed oil	do.	do.	Strong
Cedar leaf oil	do.	do.	Moderate
Cymene-p	do.	Few	Faint
Dill, oil of	do.	None	Moderate
Fennel oil	do.	do.	Strong
Galbanum oil	do.	do.	Moderate
Hemlock oil	do.	do.	Strong
Phthalol	do.	Very few	None
Rue geranium, oil of	do.	None	Moderate
Rue, oil of	do.	do.	Do.
Nine checks	Many	Many	--

Twenty-two additional chemicals appeared to be highly repellent, though not equal to those above. The odors of most of these were also very persistent.

Conocephalus (Xiphidium) fasciatus (de Geer) as a pest of bentgrass.--L. P. Rockwood, of the Forest Grove, Oreg., laboratory, reports that there has been complaint of serious damage to bentgrass meadows in Klamath County in 1935 and 1936 by this little green locustid. Observations on July 27, August 7, and August 25 confirmed the report that this species damaged the seed heads of bentgrass and yielded some information on habits and possible control methods. As there is very little known of the oviposition habits of these locustids, a special effort was made to observe oviposition or to find eggs in the meadows. In this we were unsuccessful, but it is thought that most of our observations were too early for the main oviposition period. *Conocephalus* were observed to feed on the spikelets of bentgrass in July and August and examination of many bentgrass heads showed that little seed occurred in the most heavily infested fields of Astoria bentgrass. Heads of foxtail were also bitten into. *Conocephalus* was greatly aided in this damage to the bentgrass seed crop by the work of a noctuid larva, *Polia liquida* Grote, which attacked the heads in a similar way. The two species together caused a loss of $25,000 worth of bentgrass seed, according to the owner.

JAPANESE BEETLE CONTROL

Brisk trade in nursery stock increases inspection demands.--Favorable weather conditions in the Baltimore district enabled nursery establishments to continue their plantings and to fill practically all orders on hand. Orders for nursery stock received for fall and spring planting showed a substantial increase over previous years. There was a noticeable demand for the better grades of stock. This was attributed to the large number of finer homes now under construction in the Baltimore district. In the Pittsburgh district a number of greenhouse men experienced difficulty in meeting the demands for newly introduced varieties. During the past year three establishments in western Pennsylvania have developed new plants that are in great demand. One establishment informed our inspector that they have booked orders, which cannot be filled, for 200,000 geraniums in $2\frac{1}{4}$-inch pots. Other classified nurserymen in that section report that previous one- and two-plant sales have developed into large orders, and that many home owners who previously made their own plantings are now having the nurserymen perform the landscaping work. This stimulated nursery activitiy has required maximum efforts by the available inspection force to meet the current demands for inspection and certification.

U. S. Army repulses beetles at Fort Jay.--One hundred Japanese beetle traps distributed on Governor's Island in New York Harbor caught $44\frac{1}{2}$ quarts, or approximately 145,000 beetles, between July 29 and September 12. The traps were placed too late to catch the beetles while the heaviest flight was on. Catches were negligible after August 30. The Army officials at Fort Jay made arrangements for the placing of the traps following a heavy beetle flight which reached the nuisance stage and proved of considerable annoyance to those engaged in the ordinary activities on the island. Next summer it is the intention of the officer in charge of the placing and tending of the traps to have them set and baited in time to capture the beetles emerging early.

District supervisor assists in organizing North Carolina work.--H. B. Ward, district supervisor in charge of the Richmond, Va., Japanese beetle office, spent 2 weeks assisting R. W. Leiby and State Inspector J. T. Page in the organization of the work involved in the enforcement of the North Carolina State Japanese beetle regulations. Many of the nursery and greenhouse establishments in the affected areas were visited and the regulations were explained. It was learned from the proprietors of the establishments that very few quarantined commodities are moved from the restricted zone.

Chemical treatments under way.--Early in October many classified nurseries began treatments of nursery stock with carbon disulphide emulsion. One nursery that originally planned extensive treatments with paradichlorobenzene switched to the carbon disulphide treatment as offering more satisfactory results in the disinfection of plants for forcing. A number of nurseries are experimenting with paradichlorobenzene to determine its effect on the plants they wish to ship.

Conviction secured for misuse of certificate.--After entering a plea of guilty to an information filed in the United States District Court in New York City, alleging a violation of the Plant Quarantine Act arising from the misuse of a Japanese beetle quarantine certificate in connection with a large shipment of uncertified palms and ivy plants destined to Miami, Fla., the Fight Floral Company, Inc., plant brokers of New York City, were fined $50.

Sand certification increases.--Shipments of certified sand from southern New Jersey exceeded those of any fall season for 6 or 7 years. Three and sometimes four inspectors were required for the supervision of sand pits desiring certification. Eighty-five cars of molding sand were certified in a 2-week period. Shipments of sand from the New Cumberland, Pa., district to manufacturers of safety glass also increased.

Actual inspection required of enormous quantities of strawberry plants.--Infestations of the Japanese beetle were found this summer on a number of important strawberry-plant-producing farms on the Eastern Shore of Maryland. The approximate number of plants that lost their preferred status with the finding of these infested growing units is estimated at 14,000,000 strawberry plants, 550,000 grapevines, and 400,000 black raspberries.

Cut-flower quarantine lifted.--Cut-flower inspection, carried on till the maximum date provided for in the regulations, was terminated after October 15. In Philadelphia the last beetle was found in cut flowers offered for inspection on October 3. Throughout the season, 247 adult beetles were removed from cut flowers examined at the Philadelphia wholesale houses. Toward the end of the seasonal quarantine, cut flowers were shipped out of the Baltimore market in unprecedented quantities, requiring the services of two inspectors to handle the shipments.

Grower decides to use only fumigated soil.--A geranium grower in the Philadelphia area who has had many of his potted plants killed by Japanese beetle grubs is now fumigating all of his potting soil. This grower states that one grub in a pot will eventually kill the plant.

Spruce-bough lots inspected.--The latter part of October three temporarily employed inspectors began surveying spruce-bough lots in northwestern Massachusetts and southwestern Vermont. No gypsy moth infestations have been found to date. Cutting of spruce boughs starts about October 15 and continues until the latter part of November. Boughs are put up in bales of 100 pounds each, and are shipped principally to New York City by truck or to St. Louis in carlots of 200 bales each.

New England nursery inspection under way.--On October 27 two five-man scout crews started the inspection of nurseries that are granted shipping permits under the gypsy moth quarantine regulations. Permits are granted only to nurseries free from gypsy moth infestation, both on the premises and in the immediate vicinity.

Autogiro scouting.--Autogiro scouting for Dutch elm diseased trees was completed in New York on September 30 and in New Jersey on October 2. In the entire 290 square miles scouted from the air in Orange County, N. Y., the aerial scouts located 84 individual and 3 groups of wilting elms. The ground crews working from the maps furnished by the airmen sampled and tagged 55 suspects. The autogiro returned to New Jersey at the conclusion of the Orange County work. Aerial scouting was continued in New Jersey until a second go-over in the protective area had been finished. Toward the end of the assignment, both autogiros flew in New Jersey. On the second go-over of slightly over 612 square miles in Hunterdon, Warren, and Sussex Counties, the aerial scouts located a total of 134 individual and 6 groups of wilting elms. At the conclusion of the systematic scouting for infected trees, both autogiro crews scouted for dead and dying elms on the east side of the Delaware River. In a continuous strip from 4 to 6 miles wide, the two crews covered an area of 102 square miles and located a total of 38 groups and 61 individual dead and dying elms. Most of these groups are quite large and contain many dead elm trees. On ground follow-up the ground crews tagged a total of 1,147 dead and dying elms. Some of the aerial photographic maps covered a small strip of Mercer County, and this also was scouted for dead elms by the ground crews. On October 23 the two autogiros completed their aerial survey for dead and dying trees, and switched to mapping elm-free sections in the New Jersey protective zone.

Another diseased tree between major and isolated infected areas in Connecticut.--Confirmation was recently received of an elm located at Guilford, New Haven County. This tree is approximately 8 miles east of the infected tree recently located at Branford. The 10-mile protective zone surrounding the Guilford tree almost overlaps with the protective areas surrounding the Old Lyme infection center and that adjoining the Fairfield County major infected zone. In effect, therefore, there is created a continuous protective zone from Fairfield County east through New Haven and Middlesex Counties to New London County.

Sanitation crews in field.--Most of the W. P. A. personnel was transferred to elm-sanitation work at the beginning of the monthly work period, which was delayed until October 8 in New York and Connecticut and until October 12 in New Jersey. By October 24 the men engaged in this activity numbered 2,537, of which total 145 were working in Connecticut, 1,756 in New Jersey, 533 in New York, and 103 in States outside the major infected zone. Four hundred and thirteen men were assigned to survey work to locate dead and dying elms, and 1,372 men were engaged in chemically treating with copper sulphate elms in woodland areas to be made elm-free.

Confirmations drop off.--The Dutch elm disease laboratory has completed the culturing of all samples submitted during the scouting season and further confirmations are at a minimum. During the month only 13 elms were reported as infected. The total number of confirmations to October 31 is 21,770.

FOREST INSECT INVESTIGATIONS

Fir bark louse.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports as follows on *Adelges piceae* Ratz.:"On October 5 the area at Grantham, N. H., which was sprayed in April 1935, was examined. Although there appears to be a general decrease in the infestation in this area, a few trees in the check plot show heavier attack than in 1935. On the other hand, in the 4 treated plots sprayed, respectively, with lime-sulphur 1-9, lime-sulphur 1-20, Sunoco Oil 1-25, and Volck Oil 1-25, there is no attack on the 12 marked trees in each plot. None of the sprayed trees, which were heavily attacked at the time of treatment, have died--in fact some of them appear to be in a vigorous condition. One of the objects of this spraying project was to ascertain whether the fir bark louse was the causal agent in the death of the trees or whether the trees would die from some other reason if the insects were eliminated. It appears from this study that the bark louse is the chief cause of the death of the balsam fir in this area. The four spray solutions can also be considered effective against this insect, although it is the writer's opinion that they could be used only on ornamentals, because of the expense."

Eastern spruce beetle.--J. V. Schaffner, Jr., New Haven, reports that the latest information on the extent of the infestation of *Dendroctonus piceaperda* Hopk. in the Green Mountain National Forest in Rochester, Vt., indicates that from 800-900 acres are seriously injured. A light infestation occurs in the Battell Forest Park in Hancock, Vt. Data obtained from examination of samples of bark from dead and dying trees are summarized in the following table.

Area	Trees Sampled	Trees Alive	Bark examined	*D. piceaperda* Living	*D. piceaperda* Dead	Hymenopterous parasites	Dipterous larvae[1]
	Number	Number	Sq. inches	Number	Number	Number	Number
Green Mountain National Forest	7	2	396	128	34	16	14
Battell Forest Park------------	3	2	638	63	44	21	4

[1] Possibly parasitic.

Both adults and larvae of the secondary beetles *Dryocoetes affaber* Mann., *Polygraphus rufipennis* Kby., and *Trypodendron bivitattum* Kby. were numerous in both areas, as were also larvae of Cerambycidae. Blue stain was found on one tree in Green Mountain National Forest but none in Battell Forest Park. Woodpeckers are abundant and are assisting in reducing the infestation on the national forest. A few instances were noted in Battell Park where beetles had been drowned in the flow of pitch, indicating that the trees were still in a fairly vigorous condition. It was noted that in some instances one side of the tree was attacked one year and the other side the following year. This was indicated on trees that had recently died by the presence of living beetles on one side of the tree, while on the other side the *Dendroctonus* were dead or had issued.

Forest tent caterpillar.--Mr. Schaffner reports that egg clusters of *Malacosoma disstria* Hbn., collected from sugar maples in nine towns in Vermont indicate that a considerable population of this insect still exists after 3 years' infestation. The rate of collection per hour in eight of the localities ranged from 37 to 86. At one locality only five egg clusters were collected in an hour.

Egg parasite of gypsy moth.--Mr. Schaffner also reports as follows on the abundance of *Ooencyrtus kuvanae* How., an imported egg parasite of the gypsy moth. "This egg parasite of the gypsy moth apparently has increased tremendously in certain localities in Massachusetts. Late in September it was very common on gypsy moth egg clusters in woodland in Dover, Mass., and on October 30 the adults were abundant in wooded areas at Hopkinton, Mass. Most egg clusters in this locality show many exit holes, indicating that the outer layer of eggs is well parasitized. These parasites are more abundant here than I have observed them at any time since 1917. The gypsy moth infestation in the localities mentioned is rather heavy at present."

Fluctuation of gypsy moth infestation.--W. L. Baker, New Haven, reports on an analysis of infestation data concerning the gypsy moth from a series of 172 plots running from 5 to 15 years. He says: "The purpose was to determine, if possible, the tendency of infestations to fluctuate. Taking these data and analyzing them year by year and plot by plot, it was found that out of a total of 2,322 changes in intensity of infestation, 1,143 showed gains and 1,179 losses, or 49.2 and 50.8 percent, respectively. By assembling the data in population groups it was possible to determine the percentage of infestations that registered losses the following year in passing from light to heavy infestations. These data represent the older infested region of eastern New England, and are as follows:

Egg clusters per acre any year	Infestations that increased	Infestations that decreased	
	Number	Number	Percent
Less than 100	627	401	39.0
100 - 500	362	297	45.1
500 - 1,000	107	178	62.5
1,000 - 2.000	32	196	85.9
2,000 - 3,000	10	45	81.8
3,000 - 4,000	3	29	90.6
4,000 - 5,000	1	14	93.3
Over 5,000	1	19	95.0

Low-temperature test on larvae of Black Hills beetle.--At the Fort Collins laboratory a new refrigeration unit has been installed for the purpose of determining fatal low temperatures for certain destructive forest insects. J. S. Yuill, of the Berkeley, Calif., laboratory, spent some time adjusting and checking this machine and putting it into proper running order. One test was run using 550 larvae of *Dendroctonus ponderosae* Hopk. taken from ponderosa pine at an elevation of 8,500 feet on the Roosevelt National Forest. As this is the first time such a test has ever been made on the Black Hills beetle, the preliminary results are of special interest. Eleven groups of 50 larvae each were placed in individual paraffin cells in petri dishes and exposed at the desired temperatures for 2 hours and 15 minutes. The final check 48 hours after removal from the cabinet gave the following results:

Temperature in °F.	*D. ponderosae*	
	Alive	Dead
	Percent	Percent
15.0	94	6
10.0	96	4
5.0	94	6
0.	98	2
-2.5	76	24
-5.0	70	30
-7.5	26	74
-7.5	22	78
-10.0	0	100
-10.0	0	100

The first significant brood mortality appeared at an exposure of -2.5° and this increased rapidly as the temperature decreased until at -10° no living larvae were found. This test applies only to last-stage larvae collected late in October from ponderosa pine at 8,500 feet elevation near Estes Park. Subsequent temperature tests will be made to determine such factors as seasonal differences, host differences, and differences caused by location and elevation.

Further notes on importance of 2-year cycle for Black Hills beetle at high elevations.--It has previously been demonstrated by J. M. Whiteside, of the Fort Collins laboratory, that at elevations of about 10,000 feet in southern Wyoming a period of 2 years is required for complete development of parts of some broods of the Black Hills beetle. He also found that the "second-year" beetles emerge considerably earlier than those of the main flight. The importance of this early attack is shown in data gathered on one 8-acre-strip sample plot which was cruised at intervals of 2 weeks during 1936. On July 17, before the main flight occurred, 106 trees contained new attack. On July 30, following the main flight, 166 additional trees were attacked. On August 14 only 42 additional trees were attacked and by August 28 an additional 9 trees showed attack. This gives a total of 323 new trees on the plot during 1936, of which 106 or approximately one-third were attacked by the "second-year" beetles. Reducing these data to an acre basis, we have slightly over 40 new trees per acre, of which approximately 13 are the result of early season attack. This habit of the Black Hills beetle at higher elevations has a very important bearing on control practices. In many areas it will be necessary for spotters to examine all 2-year-old attacks and mark many of them for treatment.

Bark-beetle outbreak follows fire.--J. M. Miller, of the Berkeley, Calif., laboratory, reports that the Harris Ranch burn in the Sierra National Forest occurred in August 1934. This was a severe crown fire covering some 8,000 acres and killing outright about 40 million board feet of timber. The number of living trees that survived the fire, however, was considerable, and these produced a heavy seed crop in 1935. Bark-beetle infestations, a usual aftermath of fires of this type, were expected, but these insects did not appear in force until the summer of 1936. By September of this year the western pine beetle had killed about 3,000 summer-brood trees. The attack was characterized by large groups of trees such as occur in the epidemic condition of an infestation. The outbreak was confined, however, entirely to the area of the burn, whereas the infestation in the surrounding forest was extremely light. The trees killed during the 1936 season show little evidence of fire injury. Most of them had a full crown of foliage and had also completed two fourth rings since the burn. The only evident injury was light scorching of the outer bark near the base, from a hot ground fire. The conditions in this burn differ somewhat from similar fire areas in the long interval between the fire and the subsequent development of bark-beetle infestation.

Western pine beetle infestation in central Sierras at low point.--In the central California pine region, according to Mr. Miller, infestations of the western pine beetle have been lighter than at any time during the past 5 years. This applies to the entire territory from the Eldorado to the Sequoia National Forest, where severe epidemic outbreaks occurred from 1931 to 1934. Following major control work in these areas during 1932 and 1933, maintenance was carried on until the present season. The 1936 infestation is so light, however, that no control work will be recommended for the coming winter and spring.

Fir tussock moth appears in California areas.--Mr. Miller also reports that defoliation of white fir by a tussock moth, probably *Hemerocampa pseudotsugata* McDun., was noticeable in some northern California areas and on the eastern slopes of the Sierras in 1936. This is the first time in 25 years that there has been any record of this insect becoming sufficiently abundant to cause noticeable injury, although there are some early reports of this or a similar insect defoliating white fir in the Sierras about 1906 to 1908.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

The gypsy moth project.--W. P. A. gypsy moth scouting in Vermont, Massachusetts, Connecticut, New York, New Jersey, and Pennsylvania is now operating under more favorable conditions. Except on mountain peaks in Vermont, which are covered with from 2 to 8 inches of snow, conditions are nearly ideal. By the end of the month deciduous trees throughout the area being worked had dropped all foliage, making more thorough examination of the upper branches of the trees possible. The weather was favorable for scouting generally; back roads remain dry and swamplands can be worked. Thinning work is progressing satisfactorily, except that slash still remains unburned in several areas. Much of it will be left until enough snow falls to permit burning without danger. It has always been a precautionary practice to burn only on rainy days or wet days after a rain, but accumulation of large piles of slash is in itself a fire hazard. In several sections slash piles have been burned, despite dry conditions, when it appeared rather dangerous for them to remain. The burning was done under careful supervision of a large group of men and a spray truck was detailed to the spot to pump water if the fires got out of control. During October, as in September, particular attention was given, while the weather remains favorable and before winter begins, to scouting in areas likely to be inaccessible after heavy snowfall and during spring thaws. Back-country roads become snowbound in winter and are impassable because of mud during the spring, rendering the adjacent forest inaccessible except by long and arduous cross-country hiking; steep mountain sides, when open and exposed, are extremely uncomfortable places to work on cold winter days; and swamplands and river bottoms in the spring are generally flooded, making passage impossible. By scouting such areas in the fall, before traveling becomes too difficult, they are checked over more efficiently and potentially dangerous infestations are cleaned without undue hardship. This month W. P. A. workers on the gypsy moth project have completed the removal of new sprout growth in woodlands thinned out during the previous fiscal year, in all sections of the territory where thinning work was done. Sprout removal is very essential, particularly where many birch or oak stumps are left alive to produce sprouts, which, if not cleaned out, would provide favored food for the gypsy moth caterpillars next season and thus largely defeat the control results expected from the thinning operations. At the end of October there were 2,624 W. P. A. workers engaged in gypsy moth work and since July 1 over 1,000,000 acres of woodland have been scouted in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, and Pennsylvania. Over 2,750,000 trees in open country were examined, favored food plants were thinned out and the forest thus improved on nearly 5,000 acres, and over 500,000 egg clusters were destroyed. Over half the acreage scouted and over a million of the trees in open country examined were in Vermont. Except for about 500 acres in Connecticut, practically all thinning work performed was in Massachusetts and Pennsylvania in nearly equal amount, and most of the egg clusters destroyed were in the two latter States. Scouting speed is limited in the areas where more egg clusters are found and destroyed and more forest thinning and improvement is necessary to provide future natural control. Gypsy moth work performed during October by enrollees from the C. C. C. camps east of and adjacent to the barrier zone in New England was greatly curtailed in volume, as compared with previous months. September 30 marked the end of an enrollment period and the camps are being remanned very slowly. New enrollees must undergo a 2-week hardening period at concentration points before they are released to the camps for work and the number of men allotted to gypsy moth work decreased early in the month to 717, about half the usual quota. By the end of the month an average of 993 men were allotted, many of whom are inexperienced on gypsy moth work and must be carefully trained over a period of time before full efficiency can be expected. Since July 1 in New Hampshire, Vermont, Massachusetts, and Connecticut C. C. C. men have scouted over 230,000 acres of woodland, cleaned and thinned over 2,200 acres, examined over 340,000 isolated trees in open country, and destroyed nearly 1,500,000 egg clusters. In this period 18,628 yards (over 10 miles) of stone walls have been examined for egg clusters. Examination is effected by tearing down the walls, careful scrutiny is made of each stone, and the wall then rebuilt as well as, if not better than, when found. The female gypsy moth's characteristic habit of seeking hidden shelter for oviposition explains the necessity for stone-wall examination, particularly in the more heavily infested areas where stone walls offer ideal crevices for the moths and unless thoroughly examined would be dangerous sources of infestation or reinfestation of otherwise well-cleaned woodlands. This work is often conducted under difficulty since many walls are thickly overgrown with brush and vines and the stones are heavy and hard to handle.

Progress in brown-tail moth control.--There were 353 W. P. A. brown-tail moth project employees working in Maine, New Hampshire, and Vermont during October engaged in cutting out favored food plants and destroying brown-tail moth webs. Since the beginning of the fiscal year on July 1st, 23,525 trees were cut in Maine, 33,207 in New Hampshire, and 11,299 in Vermont. In the same period 45,288 webs were destroyed in Maine and 1,645 in New Hampshire. No webs have been found to date in Vermont.

PLANT DISEASE CONTROL

Barberry eradication.--During the past few weeks areas infested with barberry bushes have been found in Yellow Medicine County, Minn., and in Steele County, N. Dak. These bushes were so situated with respect to the important grain-growing areas of these States as to constitute a distinct and direct rust hazard. The infestations were located by crews of laborers employed in connection with the emergency eradication program as a direct result of assigning labor crews to make a farm-to-farm survey for barberry bushes in the more intensively cultivated grain-growing areas of the Great Plains region. More than 3,000 barberry bushes have been eradicated in Yellow Medicine County and the limits of the area have not been reached.

Chemical eradication in Colorado.--E. A. Lungren, in charge of barberry eradication in Colorado and Wyoming, reported that 2,000 pounds of atlacide were used during October for eradicating Berberis fendleri in southwestern Colorado. Salt in solution also was used for making extensive field-eradication tests. Effective results have been obtained using 6 to 8 pounds of atlacide in 5 gallons of water to 1 square rod of ground surface. Results obtained with 36 pounds of salt in from 12 to 14 gallons of water also are encouraging. Further observations must be made in the spring, however, to determine the effectiveness of the kill.

Ribes-eradication season terminated.--In the Northeastern States the 1936 Ribes-eradication season was terminated at the end of September, except in New York and Pennsylvania where a small amount of work was carried on under the W. P. A. program during October. Control activities in this region during the period May to September, inclusive, resulted in 1,688,685 acres being cleared of 53,647,283 wild and 61,776 cultivated Ribes bushes. This work required 521,347 man-days of labor, which was performed under the Regular Cooperative, E. C. W., W. P. A., A. R. A., N. Y. A., and S. C. S. programs. Over 67 percent of the total area examined during 1936 was under the W. P. A. program, and nearly 30 percent was a result of the E. C. W. activities. Mapping of white pine and control areas will be the major field project in this region during the fall and winter months. In the Western States severe weather conditions and the complete defoliation of Ribes bushes in the western white pine region necessitated the closing out of all Ribes-eradication work in October, with the exception of the slashing programs being conducted in connection with nursery-sanitation work. The camps are being dismantled as rapidly as possible and the equipment is being trucked into the Coeur d'Alene, Idaho, warehouse for cleaning and repairing. Eradication camps in the sugar pine region have also been shut down and dismantled, with the exception of three camps in California and one in Oregon. These will continue Ribes eradication until the weather becomes too adverse for outside employment.

Blister rust host plants found infected for first time in new counties.--The North Central region leads in the number of counties from which white pine or Ribes were reported as infected for the first time in 1936. The disease was found on white pine in 10 counties in Wisconsin--Buffalo, Eau Claire, Winnebago, Rusk, Door, Vilas, Price, Langlade, Outagamie, and Waushara; 3 counties in Michigan--Schoolcraft, Saginaw, and St. Clair; and 1 in Minnesota--Todd. Infection on Ribes was found in Winnebago and Sauk Counties, Wis.; Koochiching County, Minn.; and Knox County, Ohio. These findings materially extend the known range of infection on these host plants in the Lake States. The Northeastern, Southern, Appalachian, and western white pine regions report no newly infected counties thus far this year. In the sugar pine region, the rust was found for the first time in Del Norte and Siskiyou Counties in California. Several new important infection centers were found on sugar pine in Curry, Coos, and Jackson Counties, Oreg., but these counties had been reported with minor Ribes infections in previous seasons. Ribes infection was reported for the first time from Josephine County, Oreg.

COTTON INSECT INVESTIGATIONS

Pink bollworm infestation.--H. S. Cavitt, of the Presidio, Tex., laboratory, reports on the seasonal records of the pink bollworm infestation made for comparison with previous years and for determining the factors causing variation in field infestations in the Big Bend. Biweekly counts were made in 30 fields of the infestation in blooms during June and July, and boll infestation and the number of bolls per plant during August and September. Fifteen of these were the same fields in which bloom infestation records were made in 1934 and 1935. In the 15 identical fields the average bloom infestation was 0.106 percent in 1934, 0.696 percent in 1935, and 2.262percent in 1936. Considerable variation was noted in the bloom infestation in different fields. The earlier fruiting fields showed much heavier bloom infestations than the later fields, owing to the attraction of moths to these fields. As in previous years, it was again noted that heavier early infestations were usually found in the fields with heavier types of soil, probably because of higher survival of hibernating larvae. Boll-infestation records were started in the 30 fields the first week in August. For 21 of these fields records for 1935 are available for comparison. During the first half of August the average infestation in these 21 identical fields was 14.0 percent in 1935 and 13.7 percent in 1936, or practically the same. By the latter half of September the boll infestation had increased to 72 percent in 1935 and 95 percent in 1936. At this date there was an estimated population of approximately 146,442 larvae per acre in 1935 and 222,452 in 1936, despite the fact that there were fewer bolls per plant in 1936. The average estimated number of worms in all the 30 fields counted in 1936 increased from 12,000 per acre during the first half of August to 212,000 per acre during the latter half of September.

Pink bollworm parasites.--The work on pink bollworm parasite rearing and liberation was continued this season by L. W. Noble and W. T. Hunt at Presidio, Tex., and by C. S. Rude at Tlahualilo, Durango, Mexico. Considerable difficulty was experienced at Presidio in rearing sufficient host eggs of the Mediterranean flour moth for breeding Chelonus blackburni Cam. At the beginning of the summer the eggs failed to hatch because of the high temperatures or low humidity and practically all of one generation and most of another were lost. Moving the breeding stock into the air-conditioned parasite room increased the hatch somewhat but it still remained below the percentage that hatched in the spring with fluctuating temperatures. An infestation of mites developed in the parasite room from the Mediterranean flour moth material, necessitating thorough cleaning and fumigation, and caused the loss of considerable numbers of both hosts and parasites. A rearing room for the host material was arranged in a separate adobe building by installing a home-made cooling system such as is commonly used in the west. A funnel was fitted to the window through which the air is drawn into the room by a 16-inch fan placed in the small end. The large end was covered with 4 inches of excelsior held in place by chicken wire and kept moist by a spray of water. This equipment held the temperature to about 80° F. when the outside temperatures exceeded 100°. By operating the fan only in the daytime, conditions were favorable for breeding. Despite these difficulties, about 60,000 adults of Chelonus blackburni Cam. were liberated in several colonies near Presidio, and 14,000 were shipped to Puerto

Rico. Recoveries in the field have been made in Puerto Rico. In addition, stock was furnished to the Mexican parasite laboratory at Torreon from which 20,000 were reared and liberated in Mexico in cooperation with Mr. Rude. Field recoveries in considerable numbers have been made as far as 500 meters from the point of release in Mexico. The stock of *Microbracon kirkpatricki* Wilk. was reduced to very small numbers by the mite infestation. The supply was built up to about the maximum rate of production during the latter part of September and one colony of 2,000 adults was released and others will be released in October. *Microbracon platynotae* (Cush.), one of the most important native species of Texas and Mexico, was studied by Mr. Rude. In some cases as high as 50 percent of the pink bollworms in cotton flowers were parasitized and they were also reared from larvae inside bolls. This species was also reared from the larvae of *Isophrictis* sp., a native lepidopteron quite common in Mexico in the heads of blue weed (*Helianthus ciliaris*). It can be readily reared in the laboratory by the technique used for *M. kirkpatricki*. It was observed at Presidio last fall that some of the larvae of the Hawaiian strain of *Microbracon mellitor* Say went into a resting stage at temperatures favorable for development. In December 1935, 1,418 of these larvae were placed in a refrigerated room at 38° to 40° F. and 76.5 percent emerged upon removal about 7 months later. This species breeds slowly and only one parasite develops per host larva. One colony of 1,200 was released in September but, because of the late start owing to the mite infestation, additional rearings will be placed in cold storage for next year. Some 4,000 *Exeristes roborator* Fab. were liberated in Mexico by Rude in June in the same field in which 7,000 adults were liberated by the Torreon parasite laboratory. Recoveries were made in July but later collections have failed to recover any of the species. Approximately 25,000 of this species have been released in Mexico, and 8,000 in the Presidio Valley over a period of 3 years but apparently it has not become established. One colony of 1,445 were sent to Puerto Rico in May and 3,000 were liberated at Presidio in September of this year. The earlier colonies were of the European corn borer strain but the later liberations have all been of the Egyptian pink bollworm strain. *Perisierola cellularis* var. *punctaticeps* Kief., another native parasite which is quite common on pecan-infesting Lepidoptera in Texas, was found by Rude attacking pink bollworms in flowers and worms emerging from bolls in Mexico. It is easily reared in the laboratory and requires from 10 to 13 days for a generation, at temperatures ranging from 85° to 95° F. As many as 15 parasites may develop on a single pink bollworm.

Cotton leaf hoppers.--C. F. Rainwater, of the Florence, S. C., laboratory, reports: "Cage tests were conducted during the first quarter of the year, using *Graphocephala versuta* (Say), *Alconeura unipuncta*, and *Empoasca fabae* Harris to determine (1) whether these will breed on cotton, and (2) the kind of injury they cause. These tests were replicated three times for each species, using approximately 25 specimens of each species on a single plant in each cage. The plants were freed of any insects before being caged. Two of the three *Graphocephala* cages had nymphs in them 9 days after the adults were caged. All three of the *Alconeura* cages had nymphs in them 11 days after the adults were caged. None of the *Empoasca* cages had nymphs in them. This was rather surprising because throughout the season Empoasca was present, and often in large numbers, as can be seen from the sweeping records. It did not appear likely that these numbers would have kept constantly migrating to cotton, but apparently that is what happened. The injury caused by each species is almost identical and, so far as observed, is confined to the leaves. Tiny, irregular, greenish-white feeding punctures on the upper surface of the leaves were observed in all cages. This same type of injury to the leaves was observed in every field examined during the season." Their seasonal abundance was determined by making one hundred sweeps once a week in each of ten cotton fields at Florence and Clemson College during July, August, and part of September. The average numbers taken per thousand sweeps were as follows:

Species	Florence			Clemson College		
	July	Aug.	Sept.	July	Aug.	Sept.
	Number	Number	Number	Number	Number	Number
Graphocephala versuta---	148	64	76	124	43	168
Alconeura unipuncta-----	45	36	126	66	114	138
Empoasca fabae----------	117	66	57	439	258	40

The Clemson sweepings were made by members of the experiment station entomological department.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Intensive gin-trash inspection was continued during the first part of October in the regulated area of Florida, also in that part of Florida not regulated, and in southern Georgia and southeastern Alabama. About the middle of the month ginning had largely been completed and, as results had been negative for the last two crop seasons, the Florida area was released effective October 14. Intensive inspections were also continued in the Western Extension of Texas. In Andrews County two specimens of the pink bollworm were found, one in Dawson County, the first since the 1927 crop, and two in Terry County. Gin-trash inspection has been carried on in several regulated areas for the purpose of reestablishing infestation in the 1936 crop. In the Pecos Valley of Texas specimens were found at all of the gins and also in the Safford Valley of Arizona. In the Pecos Valley of New Mexico specimens were found at several gins in the southern part, but no specimens have been found in the northern part. Infestation was reestablished in the Mesilla Valley last month and during October several additional specimens had been found. In the lower Rio Grande Valley of Texas several bales of cotton were ginned throughout the month. All trash was inspected and five additional specimens of the pink bollworm were found. These all came from a gin where specimens had previously been found. Inspections in the Delta section of Mississippi were completed and also in the Delta section of Arkansas. While the machine was being operated in Arkansas samples of trash from two gins in Missouri were inspected, the first gin-trash inspection ever done in Missouri. Inspections in the San Joaquin Valley of California were completed and some work was done in the Coachella Valley. All results were negative except for the specimens mentioned above.

Wild cotton eradication.--The eradication of wild cotton in southern Florida with small W. P. A. crews was continued throughout the month. All of the known wild cotton area which could be reached by truck had been recleaned in two counties on the west coast, and good progress was made in the other counties involved. There are many keys along the coast line which have to be worked by boat, and two crews were engaged in this activity. At the close of October the recleaning was in the best shape it has ever been at this time of year. Some 4,000 acres were recleaned, from which 270 mature, 93,845 seedling, and 1,226 sprout plants were removed. In addition over 9,000 acres were scouted without finding any plants. The areas scouted are those sections lying closely adjacent to places where wild cotton has been found.

Thurberia plant eradication.--Satisfactory progress has been made with the eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona. This work is being carried on with W. P. A. funds, with crews working out from Tucson. Most of the area that can be easily reached from Tucson has been covered. About the middle of the month a camp was established in the mountains. Permission was given for the Boy Scout camp site to be used, making it possible to establish the camp with little trouble. The crews at Camp Lawton have covered considerable acreage without finding any Thurberia plants. They have been working at altitudes of from 6,000 to 8,000 feet. Within the near future it will be determined whether or not Thurberia plants will grow in such altitudes, and if not, considerable territory can be eliminated. During October 16,740 acres were covered and 15,135 Thurberia plants were destroyed.

Road-station inspection.--During October 976 cars were inspected at the Marfa, Tex., road station, and only 10 of them were found to be carrying contraband material. Some of this material was infested with the pink bollworm. From 75 locks of seed cotton intercepted on October 3, 6 living larvae, 9 dead larvae, and 3 pupae were taken. On October 8, 50 locks of seed cotton were taken from 2 pick sacks, and in this material 5 living larvae were found. On October 24, 47 locks of seed cotton were found to contain 7 living and 5 dead larvae, and on October 26, 29 locks of seed cotton taken from 2 pick sacks contained a living larva. The road on which the station is located runs along the side of Fort D. A. Russell. During the month it was necessary to change the road so as to conform to Army regulations covering the powder magazine. The Commanding Officer inquired whether or not this change would interfere with the operation of the station and, upon being informed that it would not, he sent Army trucks and men to move the station to the new location.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Flight ability of sweetpotato weevil.--As a result of field experiments in 1936, K. L. Cockerham, of the Biloxi, Miss., laboratory, has determined that Cylas formicarius Fab. is able to fly at least 400 yards. In the course of these experiments two small patches of sweetpotatoes were planted at distances of 200 and 400 yards, respectively, from the nearest source of infestation, which comprised a storage bed containing potatoes infested by the sweetpotato weevil. Examinations in October of the sweetpotatoes growing in the two experimental plantings revealed the presence of the weevil at both points. This information will have an important bearing on recommendations for the avoidance of sweetpotato weevil infestation, since it gives pertinent information respecting the necessity of planting new fields of sweetpotatoes at a distance from fields known to be infested.

Sterilizing food of wireworms retards development and pupation.--Recent laboratory tests performed by M. W. Stone, of the Alhambra, Calif., laboratory, have indicated that the rate of development of the larvae of *Melanotus longulus* Lec. is retarded by feeding on lima beans made sterile by boiling. It has been the custom when feeding wireworms confined in ointment-can cages to boil the larger seed such as lima beans and corn in order to prevent germination of such seed. Failure to follow this procedure has resulted usually in the lids of the cages being pushed off by the germinating seed with subsequent loss of or desiccation of the larvae shortly after the lids are pushed off. Of a group of 25 *M. longulus* larvae of the 1933 brood, each of which was fed one sterile lima bean monthly from date of hatching, no pupations occurred during the period 1934-1936. On the other hand, in a group of 75 larvae of the 1933 brood, which were equally divided into 3 groups and fed various quantities of water-soaked wheat (not sterilized), 32 percent matured in 1934, 29.3 percent in 1935, and 8 percent in 1936. The maturing individuals represented 2-, 3-, and 4-year cycles, respectively. Four larvae of the original group will not mature until 1937, and 19 of the larvae succumbed during the course of the experiment. Beginning on May 1, 1936, the 17 remaining larvae of the original group of 25 that were being fed on sterile lima beans were separated in two groups. Group 1, consisting of eight larvae, were continued on the diet of one sterilized lima bean monthly. The diet of each of the nine larvae comprising group 2 was changed to one uncooked lima bean monthly. No pupations occurred during 1936 in Group 1, which were continued on sterile beans, but in Group 2 three of the larvae pupated. The larvae fed on unsterilized lima beans made greater gains in weight. Late in October the larvae in the sterile group weighed 37 mg on an average, while those fed on the unsterilized lima beans averaged 81 mg, indicating that in a period of 1 month the larvae fed on unsterilized lima beans more than doubled their weight, as compared to the slower developing larvae fed on sterile lima beans.

Comparative efficiency of different poisons and bait constituents against larvae of the southern armyworm.--Laboratory tests conducted by C. B. Wisecup, of the Sanford, Fla., laboratory, with half-grown larvae of *Prodenia eridania* Cram., using different poisons and different bait constituents, have indicated that paris green and synthetic cryolite were much superior as poisons to either phenothiazine or cube when used at ordinary dosages. There was no difference in mortality of the larvae when corn meal was substituted for cottonseed meal. The addition of syrup significantly increased the mortality, and the addition of lemons did not increase the mortality but had a slight tendency to decrease the efficiency of the bait. In general, these laboratory tests indicated that poisoned-bait mixtures consisting of bran, cottonseed meal, or corn meal, paris green, cryolite, phenothiazine, or cube, with syrup and ground lemons, were not sufficient to overcome the attractiveness of the natural green food of the southern armyworm larvae. Based on the evidence obtained during these laboratory tests, it appears that poisoned baits did not give satisfactory control of the southern armyworm under field conditions where the natural food was growing in abundance, unless excessive dosages of poison were used (approximately 7 pounds of the poison to each 100 pounds of bait) and unless the bait was placed in close proximity to the larvae.

Relative efficiency of various sprays against Mexican bean beetle in irrigated fields.--R. L. Wallis, of the Grand Junction, Colo., laboratory, reports that the results of field-control experiments performed against Epilachna varivestis Muls. during 1936 on beans grown under irrigation revealed that a derris spray suspension containing 0.015 percent rotenone is as effective against the Mexican bean beetle as a derris spray containing 0.02 percent rotenone. Sprays containing 3 pounds of cryolite to 50 gallons of water, or derris containing 0.015 percent rotenone, or cube sprays containing 0.02 percent rotenone, were more efficient that a spray containing 1 pound of zinc arsenite to 50 gallons of water. The latter spray is most commonly used by growers of beans in the Grand Junction, Colo., district. The addition of nicotine sulphate (containing 40 percent nicotine), or a diphenyl butyl sodium sulphonate wetter and spreader, to cryolite did not improve its efficiency against the bean beetle. Calcium arsenate with hydrated lime (1-6-50) gave comparatively poor results and barium fluosilicate was ineffective.

INSECTS AFFECTING MAN AND ANIMALS

Subsurface-feeding mosquito larvae destroyed with paris green.--W. V. King and T. E. McNeel, of the Orlando, Fla., laboratory, report that field tests carried out in Pinellas County, Fla., on the destruction of the larvae of Aedes taeniorhynchus Wied. and Psorophora columbiae D. and K. with paris green, in which the arsenical was mixed with water and applied with sprinkling cans, gave a high percentage of kill in varying depths of water and in the heaviest plant growths. The quantities of poison used ranged from 1 to 5 pounds per acre.

Effect of low temperatures on Hunterellus hookeri How., parasitizing American dog tick.--C. N. Smith and Helen L. Trembley, Washington, D. C., report that seven nymphs of Dermacentor variabilis Say from which the parasites were about to emerge were placed in a refrigerator at about 40° F. and were held there for periods ranging from 3 to 7 days. No parasites emerged after the nymphs were returned to a warm room. Many adults were exposed in glass vials in the same refrigerator. After 3 days' exposure 50 percent recovered, whereas after 4 and 5 days' exposure 20 percent recovered. Four females exposed for 5 days were tested for fertility by placing them in an engorging cell on a guinea pig. This cell contained nymphs which had been attached for 2 days. Of the 36 engorged nymphs that dropped, 19 were parasitized.

Soil treatment for destruction of pupae of primary screwworm fly.--E. F. Knipling and A. L. Brody, Valdosta, Ga., have determined that sodium cyanide in small dilutions gives 100-percent control of pupae of Cochliomyia americana Cushing and Patton in the soil at a cost of slightly more than 1 cent per square yard. Carbon disulphide was effective in even weaker dilutions, but the cost of carbon disulphide and the emulsifier was nearly three times that of cyanide. Pyridine, furfural, and ortho-dichlorobenzene were also 100-percent effective against pupae in the soil, but the cost of the dilutions used was considerably higher than that of sodium cyanide or carbon disulphide.

Viability of all stages of C. americana in screened cages.--Mr. Brody, working on the biology of the primary screwworm fly under artificial conditions, found: (1) The shortest preoviposition period recorded from observation of *C. americana* adults in outdoor cages during October was 6 days. (2) The shortest larval life of *C. americana* in the animal during October was about 6 days. (3) The shortest pupal period of *C. americana* during October was 13 days.

Depth of pupation and lateral migration of C. americana.--H. E. Parish and J. T. Bigham, Menard, Tex., report results of studies on the depth of pupation and lateral migration of *C. americana* larvae in soil as follows: (1) The weighted mean depth of pupation was 0.171 inch in the black-loam pecan-bottom land and 0.35 inch in the rocky, gravelly soil. (2) The weighted mean lateral migration was 12.46 inches for the black-loam pecan-bottom and 7.1 inches on the rocky, gravelly soil.

FOREIGN PARASITE INTRODUCTION

European station moved to Paris.--On October 1 the field laboratory at Hyeres, France, originally set up for conducting the parasite work on the European corn borer in France and Italy, was closed and the new laboratory established at 61 Avenue Belmontet, St. Cloud, S. & O. This location is in the suburbs of Paris and provides an excellent headquarters for the work, which extends throughout Europe and the Mediterranean region.

Hawaiian parasite project completed.--The foreign phases of the Hawaiian fruit fly control project have been completed and the four expeditions have returned. During the course of this work a total of 22 species of fruit fly parasites, totaling 2,593 individuals, reached Hawaii alive from West Africa, Brazil, Malaya, India, Puerto Rico, and Mexico. The species of *Opius* from Brazil, Puerto Rico, and Mexico, which are parasitic upon *Anastrepha* spp., did not prove adaptable to *Ceratitis*.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Four living puparia of the Mediterranean fruit fly (*Ceratitis capitata* Wied.) were taken at New York on September 29 on paper wrapping around six decayed apples in baggage from Malta. This represents the first record in our files of this fruit fly being intercepted from Malta. Fourteen puparia of the melon fly (*Bactrocera cucurbitae* Coq.) were intercepted at San Francisco on August 24 in sphagnum moss packing around young palm trees in express cargo from Hawaii. One pupal case contained a dead adult fly, from which it was possible to make a specific determination. Living specimens of the scale insect *Phenacaspis eugeniae* (Mask.) arrived at Honolulu, Hawaii, on June 8 on *Meryta sinclairii* in cargo from New Zealand. Living adults of the hairy-vetch bruchid (*Bruchus brachialis* Fahr.) were taken at Norfolk, Va., on September 3 in and on hairy-vetch seed in cargo from Hungary. The gladiolus thrips (*Taeniothrips simplex* Morison) was intercepted at Philadelphia on July 30 on gladiolus blossoms in passenger's quarters from Puerto Rico. An adult of *Sitona inops* Gyll. arrived at Baltimore, Md., on October 7 with white millet seed in the mail from Hungary. This weevil is recorded as attacking the roots and root nodules of lucerne or alfalfa in Ukraine, Union of Soviet Socialist Republics. Four living adults of the West Indian sweetpotato weevil (*Euscepes batatae* Waterh.) arrived at Mobile, Ala., on September 14 in sweetpotatoes in stores from Brazil. Living specimens of the mealybug *Pseudococcus diminutus* Leon. were intercepted at Honolulu, Hawaii, on June 8 on *Phormium cookiana* in cargo from New Zealand. A living specimen of the tingitid *Orthaea servillei* Guer. was taken at Brownsville, Tex., on June 4 on a snapdragon in baggage from Mexico. A living adult of the weevil *Metamasius submaculatus* Champ. arrived at Seattle, Wash., on July 23 on a banana fruit in cargo from Costa Rica. A living specimen of the pentatomid *Meadorus griseus* L. was intercepted at Washington, D. C., on April 24 on clematis in the mail from England. Three living larvae of the avocado seed moth (*Stenoma catenifer* Wlsm.) were intercepted at Laredo, Tex., on September 1 in an avocado seed in baggage from Mexico. A living larva of this moth was also taken at New Orleans on September 7 in the same host in baggage from British Honduras. This species feeds in the fruit and seed of avocado and appears to be of considerable economic importance by its destructiveness.

Pink bollworm intercepted in Hawaiian mail.--Four cotton bolls infested with living larvae of the pink bollworm (*Pectinophora gossypiella* Saund.) were intercepted in Hawaii in parcel-post packages destined for the mainland.

Citrus blackfly (Aleurocanthus woglumi Ashm.) found in shipment of sour limes from Bahamas.--A shipment of 8 crates of sour limes from Nassau arrived at Miami, Fla. on September 30, 1936. Inspection of 3½ crates of this shipment revealed the presence of 22 lime leaves mixed with the fruit. Seven of these leaves were found to be infested with the citrus blackfly. The shipment was refused entry and was immediately transferred to another ship at the same dock for return to Nassau. This represents the third interception of citrus blackfly on lime leaves at Miami during the month of September.

Camouflaged contraband.--boxwood among tawdry paper flowers.--A woman stepped off the gangplank at New York holding a bouquet of paper flowers, easily identified, on October 5. A dark green, natural-looking twig in the center was detected by the plant-quarantine inspector. Investigation and seizure of a cutting of boxwood, almost out of sight, followed. The *Buxus* sp.? carried live scales from Montserrat, British West Indies.

Smuggling bulbs--Custom's guard finds coat sleeves are nests for roots.--The guard at the gate of a New York pier on October 5 called the United States Deputy Surveyor because he found two packages which were hidden in a woman's coat sleeve, apparently in an attempt to smuggle them.

They contained 6 scilla bulbs and 10 lily-of-the-valley pips from Sweden, in soil. These were later turned over to the plant-quarantine inspector, and a now thoroughly frightened passenger, destined for California, promised never to attempt smuggling again. An unidentifiable damaged cast skin of a lepidopterous larva was intercepted in the soil about the lily-of-the-valley roots.

Pathological interceptions of interest.--A diseased yam from Grenada, B. W. I., intercepted at New York October 5, was found to contain a few specimens of *Cephalobus* sp., probably new, in addition to numerous *Pratylenchus* (*Anguillulina*) *pratensis* (de Man) Filipjev. A diseased carrot from England intercepted at New York on October 20 was infected with what appeared to be *Ceratostomella* *fimbriata* (E. & H.) Ell., although no report of this black-rot of sweetpotato occurring on carrot was found. Our first interception of *Cercospora* *bloxami* Berk. & Br. was made at New York on October 6 on white turnip leaves from Colombia. *Cercospora* sp., no species found listed on the host in the manuals, was intercepted on *Tradescantia* sp. from Mexico October 22 at Eagle Pass. A second interception (see N. L. for July 1935, p. 20) of *Chrysomyxa* *piperiana* (Arth.) Sacc. & Trott. was made at Blaine, Wash., on October 11 on wild rhododendron leaves from Hope, British Columbia. So little is known regarding the rust that specialists are not even sure it belongs in the genus *Chrysomyxa*. Inspectors in Washington State have been asked to be on the lookout for suitable material for study. Our first interception of *Fusicladium* *depressum* var. *petroselini* was made at New York October 3 on parsley from Poland. Our first interception of *F.* *eriobotryae* Cav. from the Philippines was made at Seattle on September 16 on fruit of *Eriobotrya* sp. Other interceptions from New York included *Glomerella* *cingulata* (Ston.) Spauld. and Schrenk on apple, first interception from Lithuania; *Pestalozzia* *palmarum* Cke., first interception on coconut and first from Puerto Rico, on October 6; *Phoma* sp., first interception on pear and first from Czechoslovakia on October 8; *Phomopsis* *vexans* (Sacc. & Syd.) Harter on eggplant, first interception from Greece on October 20; *Puccinia* *chrysanthemi* Roze on chrysanthemums, first interception from Scotland and *P.* *absinthii* (Hedw. f.) D. C., first interception, on terragon from England, on October 25.

New nema in iris bulbs named.--A new plant parasitic nematode found in iris bulbs from Holland at the Inspection House has been named *Aphelenchoides* *limberi* Steiner. "It is named in recognition of the service which D. P. Limber of the Federal Inspection House, Washington, D. C., has rendered nematology in his work." (See Proc. Helminthological Soc., Wash., vol. 3, no. 2, pp. 74-76, July 1936.)

Bulb nema and others renamed.--*Anguillulina* (*Tylenchus*) *dipsaci* (Kuhn) Gerv. and v. Ben. has been renamed *Ditylenchus* *dipsaci* (Kuhn) Filipjev, according to an article in the Proceedings mentioned in the preceding paragraph (see pp. 80-82). While it had been known for some time that a revision of the classification of the Tylenchinae was needed, it had not been done until the Russian specialist I. N. Filipjev published such a revision. In addition to the bulb nema, two others occurring rather frequently in intercepted material are renamed. *Anguillulina* *pratensis* (de Man) Goffart becomes *Pratylenchus* *pratensis* (de Man) Filipjev, and *A.* *tritici* (Steinbuch) Gerv. and v. Ben. becomes *Ditylenchus* *tritici* (Steinbuch) Filipjev.

DOMESTIC PLANT QUARANTINES

Narcissus-bulb quarantine under consideration.--A public hearing will be held at the National Museum, Washington, D. C., at 10 a. m., December 16, to consider the advisability of establishing a domestic plant quarantine requiring the treatment of narcissus bulbs and other hosts of the bulb nematode before shipment in interstate commerce.

Dutch elm disease quarantine amended.--Because of the discovery of infected elm trees in new areas during the year, the area regulated under Federal quarantine 71 was extended, effective November 9, to include new districts in Orange and Suffolk Counties, N. Y., two towns in Fairfield County, Conn., and numerous townships and boroughs in New Jersey, all contiguous to the area formerly under regulation.

Satin moth quarantine revoked.--The satin moth quarantine, which affected parts of all the New England States and of Washington State, was revoked effective November 2, owing to lack of Federal facilities for the enforcement of quarantine regulations in Oregon and Washington. The insect became established in Oregon only recently. The native and introduced insect parasites have so reduced the intensity of infestation that it is doubtful, the press notice states, whether the satin moth will ever become a serious pest in this country.

Rhode Island modifies regulations relating to white pine blister rust.--Restrictions on the planting of the yellow flowering currant in Rhode Island were removed on October 1, for the reason, the announcement states, that plant pathologists no longer class Ribes aureum and R. odoratum with the black currant in degree of susceptibility to the white pine blister rust. The modification in no way affects the prohibition relating to the planting of R. nigrum in the State.

Citrus canker inspection in Texas.--A house-to-house inspection of all properties in 27 counties in Texas and of all abandoned citrus groves in 3 additional counties was accomplished in the year ending August 31, 1936, according to a recent report from the field leader. The work included the inspection of over 2,000,000 nursery trees. Canker was found on home properties in four counties in the Galveston area, of which three were formerly known to be infected. Relief crews in Texas have destroyed approximately 6,000,000 worthless citrus trees in this period. The inspection force on September 1 was comprised of 11 Federal and 6 State employees. The peak of relief labor was reached on October 25, when 375 men were employed.

Citrus canker inspection in Alabama and Mississippi.--Citrus canker inspection now being conducted in three counties each in southern Alabama and Mississippi cooperatively with these States has thus far disclosed no canker. Citrus trifoliata trees which have lived over since the satsuma-growing industry was attempted years ago still persist in many places and are now being eradicated, over 300,000 such trees having been removed from Mississippi, and over 200,000 from Alabama in the 5-week period since the work began on September 18. One hundred relief laborers are employed in

Mississippi and 60 in Alabama. Inspectors working Honey Island Swamp in Pearl River on the Mississippi-Louisiana border report that the C. trifoliata trees existing there are the outgrowth of plantings once made in connection with an attempt to establish a bee industry on the island. Colonies of wild bees once existed on Honey Island and a physician having visions of developing a commercial bee industry planted numbers of these trees for their nectar. The island is now inhabited principally by muskrat trappers.

Transit-inspection activities.--The transit-inspection force in October was increased to 33 men working at 15 different stations throughout the country, inspecting fall nursery-stock shipments and other articles to determine compliance with domestic plant quarantine regulations. Six of the inspectors were State men and 11 were assigned from other projects of the Bureau to assist in the work. At Jacksonville, St. Paul, and St. Louis, cooperative inspection is conducted for compliance with both foreign and domestic quarantines.

Peach mosaic allotment increased.--An additional $40,000 has been made available from emergency funds for control of the peach mosaic disease. This will be used in the infected States of Arizona, California, Colorado, New Mexico, Texas, and Utah.

CONTROL INVESTIGATIONS

New laboratory device aids in aphid control.--In experiments by H. H. Richardson, at the Beltsville, Md., laboratory, on the fumigating action of nicotine, a laboratory apparatus has been devised to produce concentrations of nicotine as low as one part, or less, of nicotine per four million parts of air. The apparatus is of Pyrex glass with ground-glass connections in that part through which the nicotine gas passes. Rubber connections cannot be used because of the great affinity of rubber for nicotine, as found by Harlan and Hixon. Air flows are obtained by using compressed air, the flow being measured through calibrated flowmeters. The nicotine gas is obtained by bubbling air through pure free nicotine. Aphids have been found very susceptible to nicotine, one part nicotine per million parts of air being sufficient with a 30-minute exposure (77° F.) to give fairly high kills. Preliminary tests have also indicated that nicotine is much more effective at low relative humidities (0 percent) than at high relative humidities (75 percent). Three species of aphids are being used.

Innervation of insect hearts.--At the Beltsville laboratory N. E. McIndoo has recently studied the innervation of the dorsal blood vessels of the roach, the silkworm, and the southern armyworm. The information gained is expected to help explain the effects of nicotine on the insect heart. The dorsal blood vessel of the roach is well innervated; that of the silkworm is fairly well supplied with nerves; but this vessel in the armyworm is poorly innervated. The blood vessels of the roach and silkworm are each provided with two lateral cardiac nerves that run the full length of the vessel, but so far no cardiac nerves have been found in the armyworm.

INSECTICIDE INVESTIGATIONS

Survey of calcium arsenates completed.--The survey of the commercial calcium arsenate now on the American market, the beginning of which was noted in the News Letter for March 1936 (page 23), has now been completed. It embraced the examination of 22 samples, most of them the normal products of the manufacturing firms but a few of them special products dedeloped in an effort to overcome the phytocidal action of ordinary calcium arsenate. The chemical work of O. A. Nelson has confirmed previous findings by this Division that the various brands differ materially among themselves. His work shows again that commercial calcium arsenate is essentially a mixture of small quantities of calcium carbonate and calcium hydroxide with a true calcium arsenate whose make-up itself varies in a certain respect, namely, in the proportion of calcium oxide to arsenic oxide that it contains. We have again found that this proportion is always between 3:1 and 4:1. L. D. Goodhue has made a physical examination of these same samples by means of the apparatus mentioned in the News Letter for April 1936 (page 21), and finds that they differ greatly in their degree of fineness. The coarser sample contained only 34 percent by weight of particles having diameters less than 0.01 mm. whereas the finest sample contained 93 percent of particles of that size. There appears to be a correlation between particle size and the ratio $CaO:As_2O_5$ mentioned above, the larger ratio corresponding in general with the smaller size. There also appears to be a correlation between particle size and solubility as determined by the New York method, the coarser material giving the higher figure for soluble arsenic. All these characteristics are interlocked, and commercial calcium arsenate as normally prepared is not an equilibrium product, the differences observed being the result of differences in the degree to which equilibrium has been approached. As mentioned in the News Letter previously, all of the special products were less soluble than the corresponding regular products of the firms producing them and it can now be said also that in every case the special product was more finely divided than the regular one. Both phases of this investigation were presented at the meeting of the Eastern Branch of the American Association of Economic Entomologists in New York City on November 12-13 and will be published as soon as possible.

BEE CULTURE

Supersedure of queens.--C. L. Farrar, Laramie, Wyo., and Warren Whitcomb, Jr., Baton Rouge, La., reporting results of the season's work on the problem of supersedure, state that both the conditions under which queens are reared and the conditions surrounding the colonies into which they are introduced play a part in this phenomenon.

Marking queens.--Considerable difficulty is experienced at times in making fine enough identification dots of paint on honeybees when marking with more than one dot per bee is attempted. During the past summer W. J. Nolan, Beltsville, Md., has overcome this difficulty by the use of an injecting needle with the slanting metal point ground off. Commercial label varnish has been found a satisfactory medium for the pigments used.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Second record of a cactus weevil.--One specimen of a remarkable curculionid weevil, determined by L. L. Buchanan as Gerstaeckeria mutillaria Gerst., was intercepted on cactus from Mexico at the Yokohama, Japan, station of the Imperial Quarantine Service, and submitted for identification. This appears to be the second reported specimen of the species. The holotype is in the Berlin Museum.

Unusual record for the southern green stinkbug.--Two specimens of this injurious bug were collected on field tobacco at Windsor, Conn., in July 1936, by A. W. Morrill, Jr. The specimens were identified as Nezara viridula Linn. by H. G. Barber, who reports that this is the first record of the appearance of this species so far north of its usual range.

Interception of an injurious fulgorid.--An egg mass of a fulgorid, identified by P. W. Oman as apparently Siphanta acuta Walk., was intercepted at San Francisco (No. 9160) on Hoheria dentata from New Zealand. S. acuta, one of the Flatinae, is a native of Australia, but has been introduced into New Zealand and the Hawaiian Islands. Tillyard reports it to be abundant on the leaves of eucalyptus in Australia and New Zealand, and refers to it as the green eucalyptus hopper. In Hawaii it is known as the torpedo bug, and is reported by Swezey and Kirkaldy as at one time very abundant and a general feeder, but found especially on coffee, mango, sumac, and Acacia koa. At present S. acuta is reported to be kept under control in Hawaii by a hymenopterous egg parasite, Aphanomerus pusillus Perk.

New record of an aleyrodid from rhododendron.--Specimens of white fly taken on rhododendron at Westbury, N. Y., and submitted for determination by C. A. Weigel, of the Division of Truck Crop and Garden Insect Investigations, were determined by P. W. Mason as Trialeurodes sp. Mr. Mason reports that no species of this genus has previously been recorded from rhododendron.

An unusual coccid interception.--An adult female of the comparatively rare coccid Steingelia gorodetskia Nassanow has been identified recently by Harold Morrison, the specimen having been recorded as collected at Honolulu in packing material around Aster cordifolius shipped from England (Honolulu 9229). From the few records, the insect presumably occurs in Europe from England to Russia, but its intermediate stages and life history are unknown.

New record for coccid infesting rubber plant.--Specimens of a scale insect found on Hevea from Trinidad at the District of Columbia inspection house on June 20, 1936, collected by D. P. Limber (E. Q. No. A36691) have been identified by Harold Morrison as Lepidosaphes rubrovittatus Ckll. This is apparently the first record of the presence of this insect in the New World. It was described originally from the Philippine Islands on one of the rose apples, Eugenia malaccensis, and was later reported from Ceylon on Hevea by E. E. Green, at first as a new species, L. fasciata, but subsequently under Cockerell's name.

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